

## Types 1098-EGR and 1098H-EGR Pressure Reducing Regulators



### WARNING

Failure to follow these instructions or to properly install and maintain this equipment could result in an explosion, fire and/or chemical contamination causing property damage and personal injury or death.

Fisher® regulators must be installed, operated and maintained in accordance with federal, state and local codes, rules and regulations and Emerson Process Management Regulator Technologies, Inc. (Emerson™) instructions.

If the regulator vents gas or a leak develops in the system, service to the unit may be required. Failure to correct trouble could result in a hazardous condition.

Installation, operation and maintenance procedures performed by unqualified personnel may result in improper adjustment and unsafe operation. Either condition may result in equipment damage or personal injury. Use qualified personnel when installing, operating and maintaining the Types 1098-EGR and 1098H-EGR pressure reducing regulator.



W6956

Figure 1. Type 1098-EGR

valve is also covered when a 61 Series pilot is used. Instructions and parts lists for monitoring pilots and other equipment used with this regulator are found in separate manuals.

### Description

Types 1098-EGR and 1098H-EGR regulators provide economical and accurate pressure control in a wide variety of applications: natural gas distribution systems; fuel gas supply to industrial boilers, furnaces, ovens and mixers; and large commercial/industrial establishments such as shopping centers and schools. They are also used in plant air service and in liquid service where a slow stroking time (approximately 30 to 90 seconds) is desired on both opening and closing the main valve.

### Introduction

#### Scope of the Manual

This manual describes and provides instructions and parts list for Type 1098-EGR or 1098H-EGR regulator complete with a standard P590 Series filter and either a 6350 Series regulator, a 61 Series pilot or a Type Y600AM pilot. The Type 1806 relief



# Types 1098-EGR and 1098H-EGR

## Specifications

The Specifications section lists pressure limitations and other specifications for various Types 1098-EGR and 1098H-EGR constructions. Specifications for a given regulator as it originally comes from the factory are stamped on nameplates located on both the actuator and main valve body, while the pilot control spring range is displayed on the pilot spring case and the pilot restriction code is stamped on the pilot body (S = **standard** gain, L = low gain and H = high gain).

<b>Body Sizes and End Connection Styles</b> See Table 1	<b>Main Valve Flow Direction</b> In through the seat ring and out through the cage
<b>Main Valve Maximum Inlet Pressure<sup>(1)</sup></b> 400 psig / 27.6 bar or body rating limit whichever is lower	<b>Pressure Registration</b> External
<b>Maximum Pilot Supply Pressure<sup>(1)(2)</sup></b> 600 psig / 41.4 bar	<b>Temperature Capabilities<sup>(1)</sup></b> <b>Nitrile (NBR):</b> -20 to 180°F / -29 to 82°C <b>Fluorocarbon (FKM):</b> 0 to 300°F / -18 to 149°C, Water is limited to 0 to 200°F / -18 to 93°C <b>Ethylenepropylene (EPDM):</b> -20 to 275°F / -29 to 135°C
<b>Outlet Pressure Ranges</b> See Table 2	<b>Options</b> <ul style="list-style-type: none"><li>• NACE Construction</li><li>• Boiler Fuel Construction</li><li>• Aqueous Service Construction</li><li>• Monitor Configuration</li><li>• Noise Abatement Trim</li></ul>
<b>Maximum and Minimum Differential Pressures</b> See Table 4	
<b>Actuator Sizes and Maximum Pressures</b> See Table 3	
<b>Main Valve Flow Characteristic</b> Linear ( <b>standard</b> ), Whisper Trim™ or Quick opening	

1. The pressure/temperature limits in this Instruction Manual or any applicable standard limitation should not be exceeded.  
2. For stability or overpressure protection, a reducing regulator may be installed upstream of the pilot according to the Installation section.

**Table 1. Body Sizes and End Connection Styles**

BODY SIZE		CAST IRON	STEEL OR STAINLESS STEEL
N PS	DN		
1 or 2	25 or 50	NPT, CL125 FF or CL250 RF	NPT, CL150 RF, CL300 RF, CL600 RF, BWE, SWE or PN 16/25/40
3, 4 or 6	80, 100 or 150	CL125 FF or CL250 RF	CL150 RF, CL300 RF, CL600 RF, BWE or PN 16/25/40
8 x 6 or 12 x 6	200 x 150 or 300 x 150	---	CL150 RF, CL300 RF, CL600 RF or BWE

# Types 1098-EGR and 1098H-EGR

**Table 2. Outlet Pressure Ranges**

PILOT TYPE	OUTLET PRESSURE RANGE		SPRING COLOR	SPRING PART NUMBER
	psig	bar		
6351	3 to 20	0.21 to 1.4	Green	1B986027212
	5 to 35	0.35 to 2.4	Unpainted	1B788327022
	35 to 100	2.4 to 6.9	Red	1K748527202
6352	14 in. w.c. to 2 psig 2 to 10	35 mbar to 0.1 bar 0.14 to 0.69	Yellow Black	14A9672X012 14A9673X012
6353	3 to 40	0.21 to 2.8	Yellow	1E392527022
	35 to 125	2.4 to 8.6	Red	1K748527202
6354L <sup>(1)</sup>	85 to 200	5.9 to 13.8	Blue	1L346127142
6354M <sup>(2)</sup>	175 to 220	12.1 to 15.2	Blue	1L346127142
6354H <sup>(2)</sup>	200 to 300	13.8 to 20.7	Green	15A9258X012
61L 61LD 61LE 61H	7 in. w.c. to 2 psig	17 mbar to 0.1 bar	Red	1B886327022
	1 to 5	0.07 to 0.3	Yellow	1J857827022
	2 to 10	0.14 to 0.69	Blue	1B886427022
	5 to 15	0.35 to 1.0	Brown	1J857927142
	10 to 20	0.69 to 1.4	Green	1B886527022
61HP	10 to 65	0.69 to 4.5	Green Stripe	0Y066427022
	15 to 45	1.0 to 3.1	Yellow	1E392527022
	35 to 100	2.4 to 6.9	Blue	1D387227022
	100 to 300	6.9 to 20.7	Red	1D465127142
Y600AM	4 to 8 in. w.c.	10 to 20 mbar	Red	1B653827052
	7 to 16 in. w.c.	17 to 4 mbar	Unpainted	1B653927022
	15 in. w.c. to 1.2 psig	37 mbar to 0.08 bar	Yellow	1B537027052
	1.2 to 2.5	0.08 to 0.17	Green	1B537127022
	2.5 to 4.5	0.17 to 0.31	Light Blue	1B537227022
	4.5 to 7	0.31 to 0.48	Black	1B537327052

1. Without diaphragm limiter.

2. With diaphragm limiter.

**Table 3. Actuator Sizes and Maximum Pressures**

ACTUATOR TYPE	ACTUATOR SIZE	OUTLET CONTROL PRESSURE		EMERGENCY CASING PRESSURE	
		psig	bar	psig	bar
1098	30	100	6.9	115	7.9
	40 (standard)	75	5.2	82	5.6
	70	50	3.4	65	4.5
1098H	30	350	24.1	400	27.6

**Table 4. Maximum and Minimum Differential Pressures for Main Valve Selection**

BODY SIZE		SPRING PART NUMBER	SPRING COLOR	MAXIMUM ALLOWABLE DIFFERENTIAL PRESSURE <sup>(1)</sup>		MINIMUM DIFFERENTIAL PRESSURE REQUIRED FOR FULL STROKE					
						Size 30 Actuator		Size 40 Actuator		Size 70 Actuator	
NPS	DN			psig	bar	psig	bar	psig	bar	psig	bar
1	25	14A9687X012	Green	60	4.1	3.5	0.24	2.5	0.17	1	0.07
		14A9680X012	Blue	125	8.6	5	0.34	3	0.21	1.5	0.10
		14A9679X012	Red	400 <sup>(3)</sup>	27.6 <sup>(3)</sup>	7	0.48	5	0.34	2.5	0.17
2	50	14A6768X012	Yellow	20	1.4	----	----	----	----	1	0.07
		14A6626X012	Green	60	4.1	4	0.28	3	0.21	1.5	0.10
		14A6627X012	Blue	125	8.6	6	0.41	5	0.34	2	0.14
		14A6628X012	Red	400 <sup>(3)</sup>	27.6 <sup>(3)</sup>	11	0.76	10	0.69	3	0.21
3	80	14A6771X012	Yellow	20	1.4	----	----	----	----	1	0.07
		14A6629X012	Green	60	4.1	5	0.34	4	0.28	2	0.14
		14A6630X012	Blue	125	8.6	8	0.55	6	0.41	2.5	0.17
		14A6631X012	Red	400 <sup>(3)</sup>	27.6 <sup>(3)</sup>	14	0.97	11	0.76	4	0.28
4	100	14A6770X012	Yellow	20	1.4	----	----	----	----	1.3	0.09
		14A6632X012	Green	60	4.1	10	0.69	5	0.34	2.5	0.17
		14A6633X012	Blue	125	8.6	13	0.90	8	0.55	3	0.21
		14A6634X012	Red	400 <sup>(3)</sup>	27.6 <sup>(3)</sup>	22	1.5	13	0.90	5	0.34
6, 8 x 6 or 12 x 6	150, 200 x 150 or 300 x 150	15A2253X012	Yellow	20	1.4	----	----	----	----	2.2	0.15
		14A9686X012	Green	60	4.1	13	0.90	9.5	0.66	4	0.28
		14A9685X012	Blue	125	8.6	19	1.3	14	0.97	6	0.41
		15A2615X012	Red	400 <sup>(3)</sup>	27.6 <sup>(3)</sup>	28 <sup>(2)</sup>	1.9 <sup>(2)</sup>	19	1.3	8	0.55

1. Maximum inlet pressure is equal to set pressure plus maximum differential.

2. Requires special 6300 Series pilot construction without integral relief valve and with external Type 1806 40 psid / 2.8 bar d relief valve.

3. Should not exceed the body rating limit. Use this pressure value or the body rating limit, whichever is lower.

# Types 1098-EGR and 1098H-EGR

**Table 5. Supply Pressure Settings Required for the Type 95H Regulator**

BODY SIZE		TYPE EGR SPRING COLOR	SUPPLY PRESSURE											
			Type Y600AM Spring Color											
			Red		Unpainted		Yellow		Green		Light Blue		Black	
NPS	DN		psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar
1	25	Green	6	0.41	6	0.41	7	0.48	8	0.55	11	0.76	13	0.90
		Blue	7	0.48	7	0.48	8	0.55	10	0.69	13	0.90	14	0.97
		Red	8	0.55	8	0.55	9	0.62	11	0.76	14	0.97	15	1.0
2	50	Green	6	0.41	6	0.41	7	0.48	9	0.62	12	0.83	13	0.90
		Blue	8	0.55	8	0.55	9	0.62	11	0.76	14	0.97	15	1.0
		Red	13	0.90	13	0.90	14	0.97	16	1.1	19	1.3	20	1.4
3	80	Green	7	0.48	7	0.48	8	0.55	10	0.69	13	0.90	14	0.97
		Blue	9	0.62	9	0.62	10	0.69	12	0.83	15	1.0	16	1.1
		Red	14	0.97	14	0.97	15	1.0	17	1.2	20	1.4	21	1.5
4	100	Green	8	0.55	8	0.55	9	0.62	11	0.76	14	0.97	15	1.0
		Blue	11	0.76	11	0.76	12	0.83	14	0.97	17	1.2	18	1.2
		Red	16	1.1	16	1.1	17	1.2	19	1.3	22	1.5	23	1.6
6 or 8 x 6	150 or 200 x 150	Green	13	0.90	13	0.90	14	0.97	15	1.0	18	1.2	20	1.4
		Blue	17	1.2	17	1.2	18	1.2	20	1.4	23	1.6	24	1.7
		Red	22	1.5	22	1.5	23	1.6	25	1.7	28	1.9	29	2.0

1. The pressures shown in the table are the minimum supply pressures required by the pilot. If the inlet pressure is less than shown, an external pilot supply is necessary.

## Principle of Operation

The pilot-operated Types 1098-EGR and 1098H-EGR regulators both use inlet pressure as the operating medium, which is reduced through pilot operation to load the actuator diaphragm. Outlet or downstream pressure opposes loading pressure in the actuator and also opposes the pilot control spring. The Type 1098-EGR regulator operation schematic is shown in Figure 2.

In operation, assume that outlet pressure is below the pilot control setting. Control spring force on the pilot diaphragm opens the pilot valve plug providing additional loading pressure to the actuator diaphragm. This loading pressure forces the actuator stem forward, opening the main valve plug via a bump connection. The upward motion of the plug allows gas to flow through the cage into the downstream system.

When downstream demand has been satisfied, outlet pressure tends to increase, acting on the pilot and actuator diaphragms. This pressure exceeds the pilot control spring setting, moving the pilot diaphragm away and letting the valve plug spring (Type 6351, 61 Series or Type Y600AM pilots) or bellows (Types 6352 through 6354M pilots) close the pilot valve plug (unbalanced in the Type 6351 or 61 Series pilots but balanced in the Types 6352 through 6354M pilots). Excess loading pressure on the actuator diaphragm escapes downstream through the bleed hole (Type 6351 pilot), bleed orifice (61 Series pilot), restriction (Types 6352 through 6354M pilots) or fixed restrictor (Type Y600AM pilot).

Reduced actuator loading pressure permits the main valve to close. The combination of main valve spring force and valve plug imbalance provides positive valve plug shutoff against the port and upper seals.

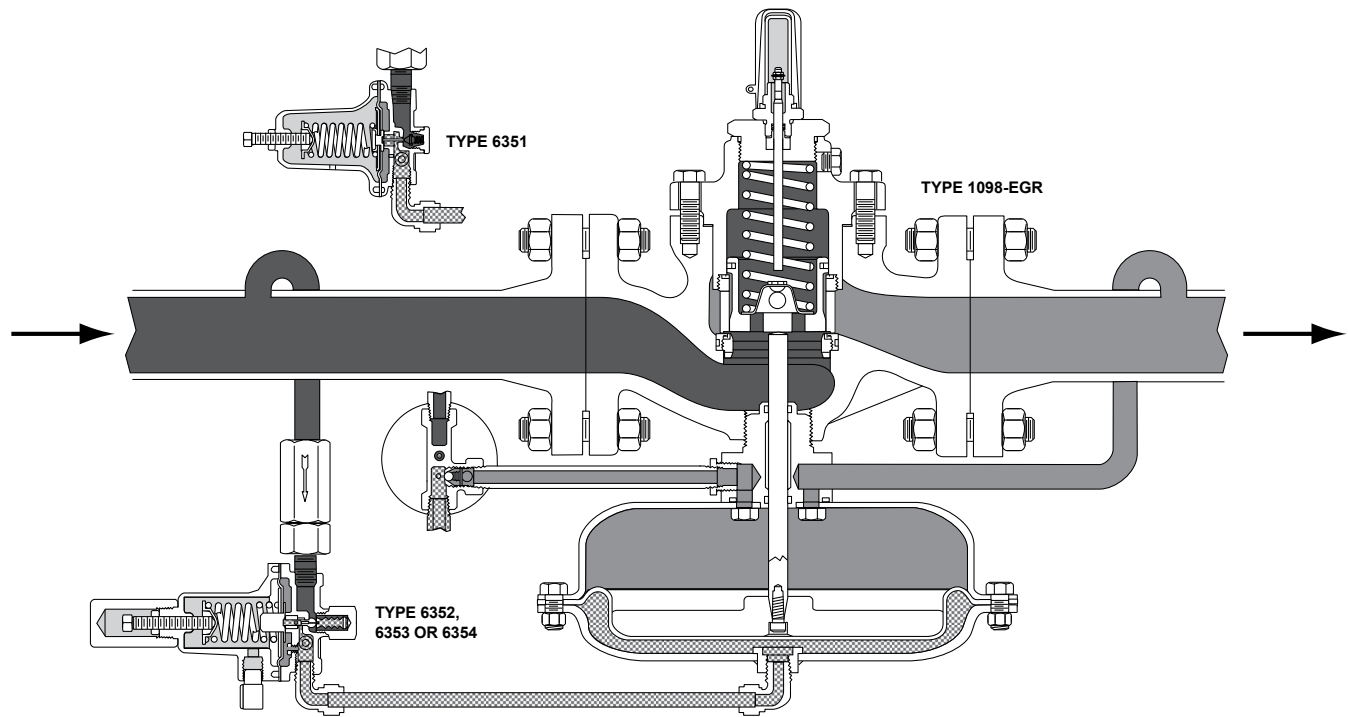
To protect the Type 1098 or 1098H actuator diaphragm from excessive differential pressure, the 6300 Series pilots have a relief valve that allows loading pressure to bleed downstream at approximately 25 psig / 1.7 bar differential across the actuator diaphragm. An external relief valve (Type 1806) is required when differential is higher than 25 psi / 1.7 bar or when using the 61 Series or Y600AM pilots.

## 40 psi / 2.8 bar Relief Valve

A mounting assembly for a 40 psi / 2.8 bar differential relief valve is available for the Type 1098-EGR. The standard 25 psi / 1.7 bar differential relief valve construction is integrally mounted between the loading and downstream pressures in the 6351 through 6354 Series regulating pilots. Both differential relief valves protect the main regulator diaphragm from damage that may occur from too high differential between the loading pressure and downstream pressure.

The 40 psi / 2.8 bar differential relief valve construction is designed specifically for the red main valve spring selection in the NPS 6 / DN 150 Type 1098-EGR-6354 with the size 30 actuator. This construction uses the Type 1806H relief valve (with a setting of 40 psi / 2.8 bar) to relieve excess loading pressure and does not interfere with the normal operation of the regulator.

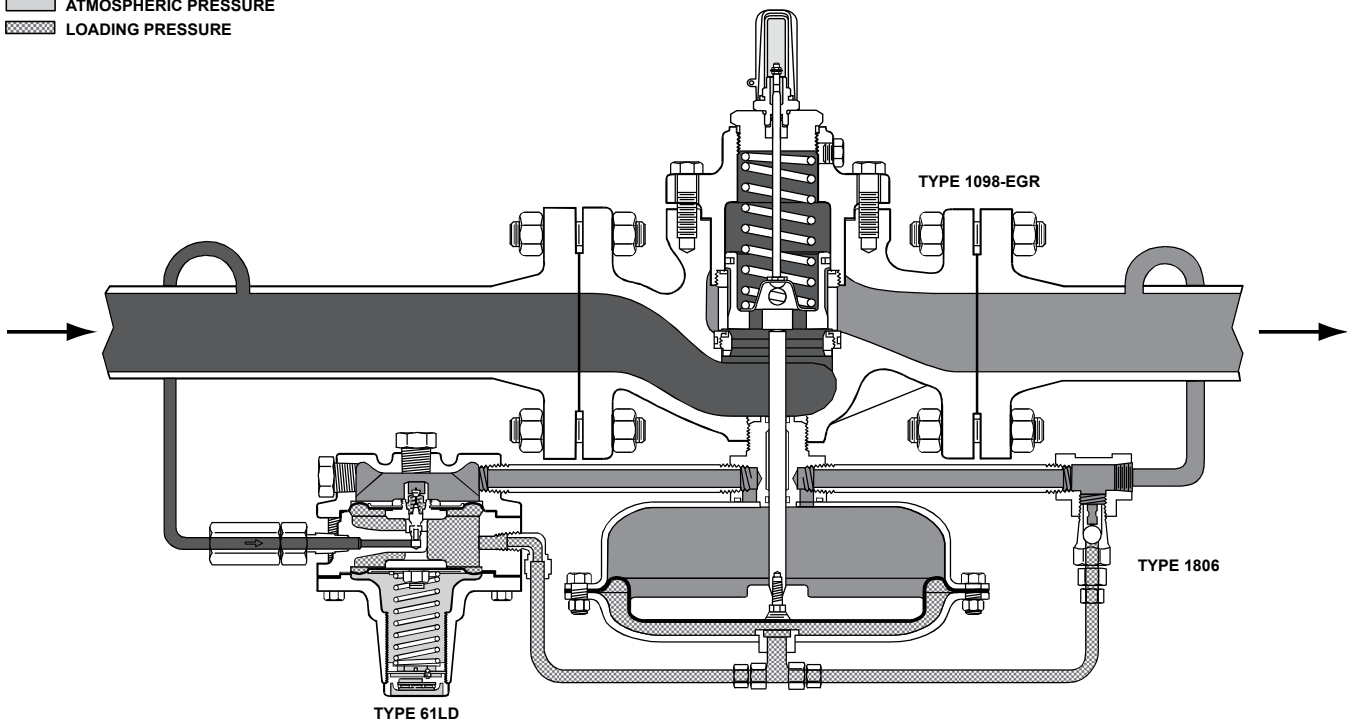
# Types 1098-EGR and 1098H-EGR



TYPE 1098-EGR WITH 6350 SERIES PILOT

A6563

- INLET PRESSURE
- OUTLET PRESSURE
- ATMOSPHERIC PRESSURE
- LOADING PRESSURE



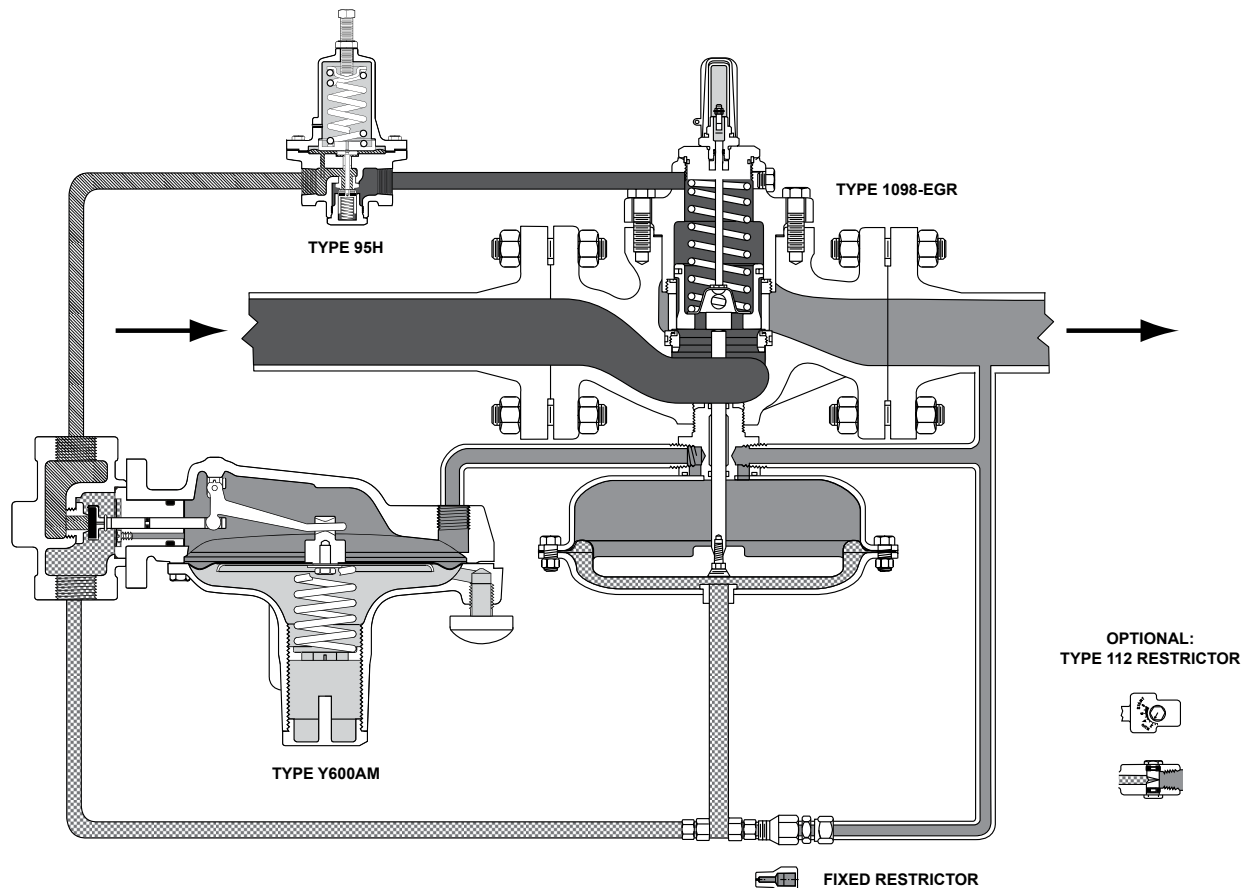
TYPE 1098-EGR WITH TYPE 61LD PILOT AND TYPE 1806 RELIEF VALVE

A6641

- INLET PRESSURE
- OUTLET PRESSURE
- ATMOSPHERIC PRESSURE
- LOADING PRESSURE

Figure 2. Operational Schematics

# Types 1098-EGR and 1098H-EGR



M1008

TYPE 1098-EGR WITH TYPE Y600AM PILOT AND TYPE 95H PRESSURE SUPPLY REGULATOR

- INLET PRESSURE
- OUTLET PRESSURE
- ATMOSPHERIC PRESSURE
- LOADING PRESSURE
- PILOT SUPPLY PRESSURE

Figure 2. Operational Schematics (continued)

## Installation and Startup



### WARNING

Personal injury, equipment damage or leakage due to escaping accumulated gas or bursting of pressure-containing parts may result if this regulator is overpressured or is installed where service conditions could exceed the limits given in the Specifications section and on the appropriate nameplate or where conditions exceed any ratings of the adjacent piping or piping connections. To avoid such injury or damage, provide pressure-relieving or pressure-limiting devices to prevent service conditions from exceeding those limits.

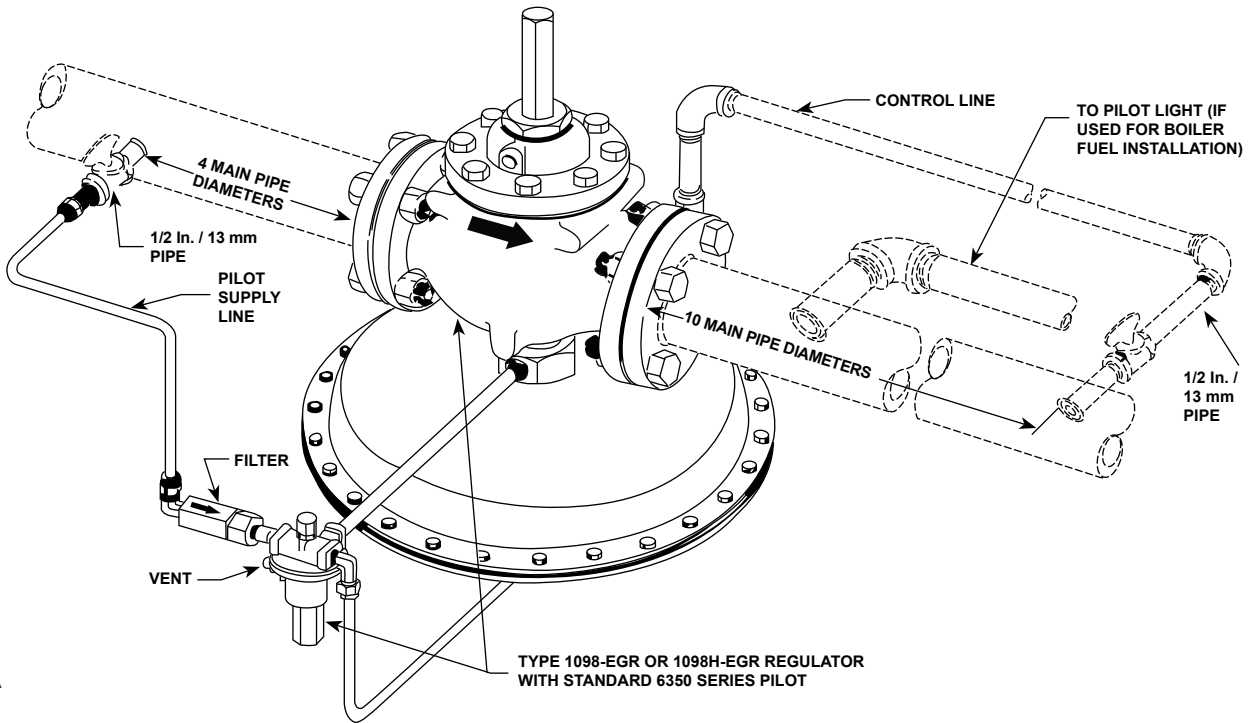
Additionally, physical damage to the regulator may result in personal injury and property damage due to escaping accumulated gas. To avoid such injury and damage, install the regulator in a safe location.

## Standard Single-Pilot Regulator (Figure 3)

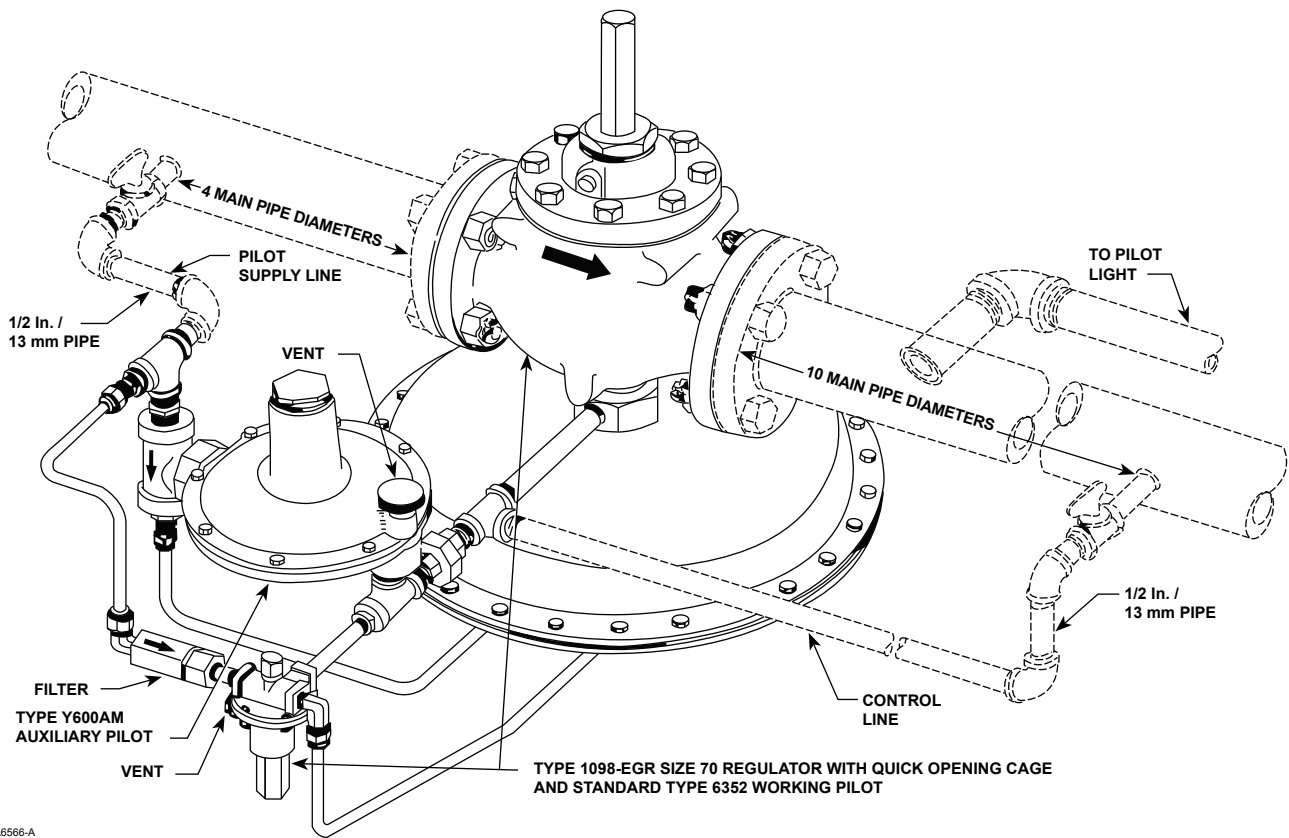
### Installations

A Type 1098-EGR or Type 1098H-EGR regulator bleeds no gas to the atmosphere, making it suitable for installation in pits or other enclosed locations without elaborate venting systems. This regulator can also be installed in pits subject to flooding by venting the pilot spring case above the expected flood level so that the pilot diaphragm is exposed to atmospheric pressure.

# Types 1098-EGR and 1098H-EGR



**Figure 3. Standard Single-Pilot Installation**



**Figure 4. Typical Dual-Pilot Boiler Fuel Installation**

# Types 1098-EGR and 1098H-EGR

## Note

**Normal pressure drop assists shutoff. Therefore, leakage may result during any reverse pressure drop condition.**

1. Use qualified personnel when installing, operating and maintaining regulators. Before installing, inspect the main valve, pilot and tubing for any shipment damage or foreign material that may have collected during crating and shipment. Make certain the body interior is clean and the pipelines are free of foreign material. Apply pipe compound only to the external pipe threads with a screwed body or use suitable line gaskets and good bolting practices with a flanged body.

With a weld end body, be sure to remove the trim package, including the gasket, according to the Maintenance section before welding the body into the line. Do not install the trim package until any post-weld heat treatment is completed. If heat treating, prevent scale buildup on all machined guiding and sealing surfaces inside the body and at the bonnet flange / body joint.

## Note

**Install so that flow through the main valve matches the flow arrow attached to the valve body.**

2. Install a three-valve bypass around the regulator if continuous operation is necessary during maintenance or inspection. The pilot may be field-changed to the opposite-side mounting position by swapping the pilot pipe nipple to the opposite bonnet tapping.



## WARNING

**A regulator may vent some gas to the atmosphere. In hazardous or flammable gas service, vented gas may accumulate and cause personal injury, death or property damage due to fire or explosion. Vent a regulator in hazardous gas service to a remote, safe location away from air intakes or any hazardous location. The vent line or stack opening must be protected against condensation or clogging.**

3. To keep the pilot spring case vent from being plugged or the spring case from collecting moisture, corrosive chemicals or other foreign material, point the vent down or otherwise protect it. To remotely vent the standard pilot, remove the vent and install obstruction-free tubing or piping into the 1/4 NPT vent tapping. Provide protection on a remote vent by installing a screened vent cap into the remote end of the vent pipe.
4. Run a 3/8 in. / 9.5 mm outer diameter or larger pilot supply line from the upstream pipeline to the filter inlet as shown in Figure 3. Do not make the upstream pipeline connection in a turbulent area, such as near a nipple, swage or elbow. If the maximum pilot inlet pressure could exceed the pilot rating, install a separate reducing regulator in the pilot supply line. Install a hand valve in the pilot supply line and provide vent valves to properly isolate and relieve the pressure from the regulator.
5. Attach a 1/2 NPT downstream pressure control line downstream of the regulator in a straight run of pipe, as shown in Figure 3. Do not make the tap near any elbow, swage or nipple that might cause turbulence. Connect the other end of the control line to the bonnet connection. Install a hand valve in the control line to shut off the control pressure when the bypass is in use.
6. If a quick acting solenoid is to be installed downstream of the regulator, the regulator and solenoid should be located as far apart as practical. This maximizes the gas piping volume between the regulator and solenoid and improves the regulator response to quick-changing flow rates.
7. Consult the appropriate instruction manual for installation of an optional Type 662 pneumatic or electric remote control drive unit. For optional remote pneumatic loading of a 6350 or 61 Series pilot, make the loading piping connections to the 1/4 NPT vent connection.

## Pre-startup Considerations

Before beginning the startup procedures in this section, make sure the following conditions are in effect:

- Block valves isolate the regulator.
- Vent valves are closed.
- Hand valves are closed.





## CAUTION

**Introduce pilot supply pressure into the regulator before introducing any downstream pressure or internal damage may occur due to reverse pressurization of the pilot and main valve components.**

Always use pressure gauges to monitor downstream pressure during startup. Procedures used in putting this regulator into operation must be planned accordingly if the downstream system is pressurized by another regulator or by a manual bypass.

### Note

**For proper operation, pilot supply pressure must exceed control pressure by the minimum amount specified on the actuator nameplate as minimum differential pressure.**

The only adjustment necessary on a Type 1098-EGR or 1098H-EGR regulator is the pressure setting of the pilot control spring. Turning the adjusting screw clockwise into the spring case increases the spring compression and pressure setting. Turning the adjusting screw counterclockwise decreases the spring compression and pressure setting.

### Pilot Adjustment

**To adjust standard 6350 Series pilots:** Loosen the locknut and turn the adjusting screw. Then tighten the locknut to maintain the adjustment position. On a standard Types 6352 through 6354M pilots, closing cap must be removed before adjustment and replaced afterward.



## WARNING

**To avoid possible personal injury from a pressure-loaded pilot, carefully vent the spring case before removing the closing cap. Otherwise, trapped loading pressure could forcefully eject the freed closing cap.**

**To adjust the 61 Series or Type Y600AM pilots:** Remove the closing cap and turn the adjusting screw. Any adjustments made should set the controlled pressure within the appropriate spring range shown in the Table 2.

### Startup

1. Slowly open the pilot supply line hand valve.
2. Slowly open the upstream block valve and partially open the downstream block valve for minimum flow. Slowly open the hand valve in the control line.
3. Adjust the pilot setting, if necessary.
4. Completely open the downstream block valve.
5. Slowly close the bypass valve, if any.

### Dual-Pilot Boiler Fuel Control

#### Applications

##### Boiler Fuel Pressure Control

To enhance proper operation and adequate response to negative pressure shock condition in low differential pressure boiler fuel control applications, use the Type 1098-EGR boiler fuel configuration:

- Type 1098-EGR with Type 6352 pilot
- Size 70 Actuator
- Quick Opening Cage
- Yellow Main Spring
- Type Y600AM or 627M Auxiliary Pilot mounted in parallel with the Type 6352 pilot

To provide faster response, two pilots mounted in parallel sense the downstream pressure. The Type 6352 pilot is the primary controlling pilot and the Type Y600AM or 627M auxiliary pilot stands by until it senses a negative pressure shock condition. The auxiliary pilot opens, allowing additional flow into the actuator, increasing the stroking speed and providing faster response. See Figure 5 for schematic. The quick-opening cage allows maximum capacity at shorter travels to decrease stroking time in opening and closing directions. The service conditions should not exceed 20 psig / 1.4 bar maximum inlet pressure and 10 psi / 0.69 bar maximum differential pressure.

Supply the boiler pilot light gas with the Type 1098-EGR. The pilot light gas supply line should branch off the main fuel line downstream of the Type 1098-EGR and include a separate regulator to control the final pilot light gas pressure, if required (see Figure 6). This allows the Type 1098-EGR to have its main valve plug just off the seat waiting for the sudden negative shock created when the boiler solenoid valve is opened to light the boiler to the high fire load. This installation practice significantly increases the stroking speed of the Type 1098-EGR. See Figure 6 for schematic.

# Types 1098-EGR and 1098H-EGR

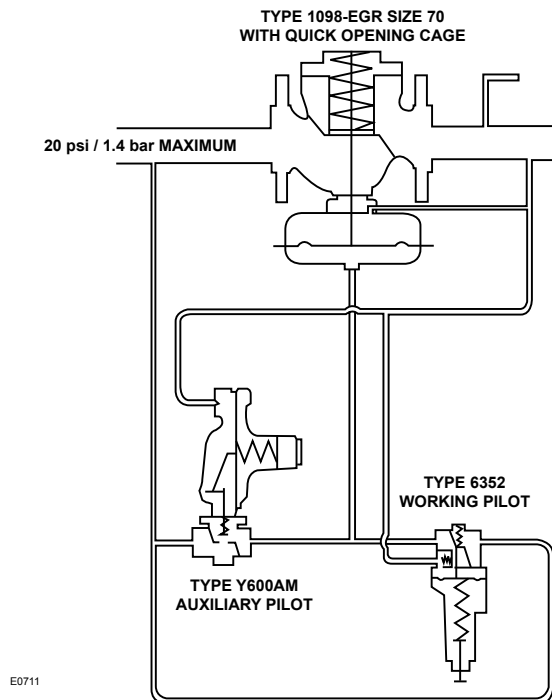


Figure 5. Boiler Fuel Configuration

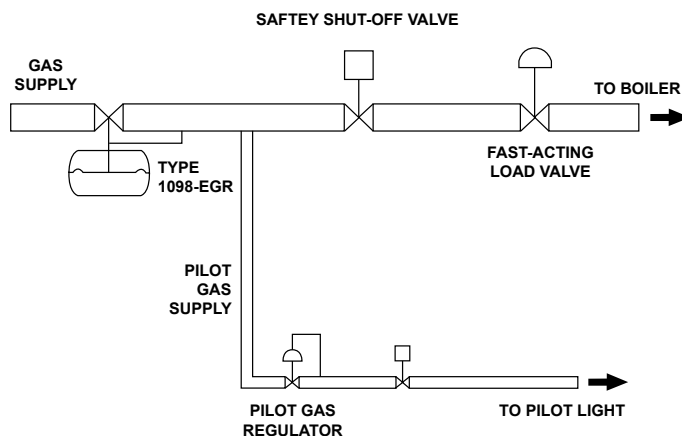


Figure 6. Boiler Fuel Configuration Installation Guide

## Note

**Modulating solenoid load valves provide a definite time delay in moving from one position to the other, effectively preventing sudden pressure changes in the system. Alternately, a snap-acting solenoid valve can be furnished with a characterized valve plug that, by allowing maximum capacity to be reached at a greater proportion of total travel, slows the action slightly. This action does not control shock as effectively as modulating solenoid valves.**

## Installation

1. Perform the Standard Single-Pilot Regulator Installation section through step 3, making sure that the regulator is installed with the actuator below the main valve as shown in Figure 4.
2. Run a 1/2 in. / 13 mm or larger pilot supply line from the upstream pipeline to the 1/2 NPT supply connection in the pipe tee as shown in Figure 4. Do not make the connection in a turbulent area, such as near a nipple, swage or elbow. If the maximum pilot inlet pressure could exceed the pilot rating, install a separate regulator in the pilot supply line and provide vent valves so that pressure can be properly isolated and relieved from the regulator.
3. Attach a 1/2 NPT downstream pressure control line ten pipe diameters downstream of the regulator in a straight run of pipe. Do not make the tap near any elbow, swage or nipple, which might cause turbulence. Connect the other end of the control line to the 1/4 NPT connection in the control pipe tee as shown in Figure 4. Install a hand valve in the control line to shut off the control pressure when the bypass is in use. Also use the hand valve to dampen out pulsations, which may cause instability or cycling of the regulator.
4. Consult the appropriate instruction manual for installation of an optional pneumatic or electric remote control drive unit. For optional remote pneumatic loading of 6350 or 61 Series pilots, make the loading piping connections to the 1/4 NPT vent connection.

# Types 1098-EGR and 1098H-EGR

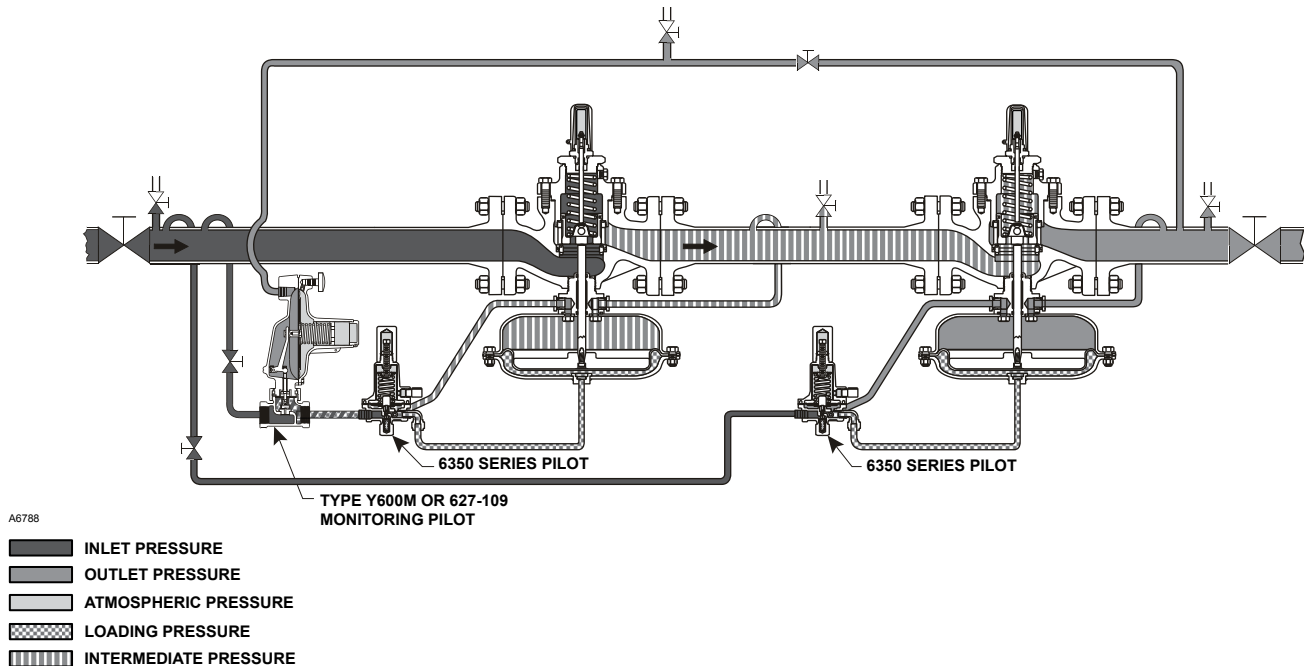


Figure 7. Typical Working Monitor Installation

## Startup

1. Slowly open the pilot supply line hand valve.
2. Slowly open the upstream block valve and partially open the downstream block valve for minimum flow.
3. Slowly open the hand valve in the control line and make sure that the standby pilot is set far enough below the working pilot so that the standby pilot remains closed during normal operation. For example, with final desired settings of 11 in. w.c. / 27 mbar for the working pilot and 10 in. w.c. / 25 mbar for the standby pilot, begin by reducing the working pilot setting far enough below 10 in. w.c. / 25 mbar for the working pilot to shut off. Then set the standby pilot for an outlet pressure of 10 in. w.c. / 25 mbar. Finally, set the working pilot for an outlet pressure of 11 in. w.c. / 27 mbar. Table 6 shows how close the standby pilot can be set to the working pilot setting.
4. Completely open the downstream block valve.
5. Slowly close the bypass valve, if any.

## Working Monitor (Figure 7)

### Installation

1. For both working monitor regulator and working regulator, perform the Standard Single-Pilot Regulator Installation section through step 6.

2. Connect another downstream pressure control line and hand valve (Figure 7) to the monitoring pilot according to the monitoring pilot instruction manual. Attach a 1/2 NPT pressure control line and hand valve from the intermediate pressure pipeline to the working monitor regulator. Pipe supply pressure between the monitoring pilot and the working monitor regulator according to the monitoring pilot manual.

For two typical monitoring pilots, Table 7 gives the spread between normal distribution pressure and the minimum pressure at which the working monitor regulator can be set to take over if the working regulator fails to open.

### Startup

On a working monitor installation (Figure 7), be sure that the second-stage working regulator is set to operate at a pressure lower than the Type 1098-EGR or 1098H-EGR working monitor regulator. To do this, increase the setting of the monitoring pilot until the working pilot is in control of the intermediate pressure and the second-stage working regulator is in control of the downstream pressure. If this is not done, the monitoring pilot tries to take control of the downstream pressure.

1. Slowly open the upstream block valve and the hand valves in both pilot supply lines. This energizes both pilots so that their setpoints can be adjusted. Partially open the downstream block valve for minimum flow.

# Types 1098-EGR and 1098H-EGR

**Table 6. Auxiliary Pilot Selection (Fast Stroke Dual Pilot)**

SIZE	CONSTRUCTION	ORIFICE		SPRING RANGE		SPRING NUMBER	SPRING COLOR	MINIMUM PRESSURE AT WHICH AUXILIARY PILOT CAN BE SET
		In.	mm	psi	bar			
3/4 NPT	Type Y600AM	1/4	6.4	4 to 8 in. w.c.	10 to 20 mbar	1B653827052	Red	1 in. w.c. / 2 mbar Under working pilot setpoint
				7 to 16 in. w.c.	17 to 40 mbar	1B653927022	Unpainted	
				15 in. w.c. to 1.2 psi	37 mbar to 0.08 bar	1B537027052	Yellow	
				1.2 to 2.5	0.08 to 0.17	1B537127022	Green	6 in. w.c. / 14 mbar Under working pilot setpoint
				2.5 to 4.5	0.17 to 0.31	1B537227022	Light Blue	
				4.5 to 7	0.31 to 0.48	1B537327052	Black	
	Type 627M	1/2	13	5 to 10	0.34 to 0.69	10B3076X012	Yellow	8 in. w.c. / 21 mbar Under working pilot setpoint

**Table 7. Working Monitor Performance**

MONITORING PILOT INFORMATION				MINIMUM PRESSURE AT WHICH WORKING MONITOR REGULATOR CAN BE SET
Construction	Spring Range		Spring Part Number	
	psig	bar		
Type 161AYW pilot and 150 psig / 10.3 bar maximum allowable pilot inlet pressure	3 to 12 in. w.c. 11 to 25 in. w.c.	7 to 30 mbar 27 to 62 mbar	1B653927022 1B537027052	3 in. w.c. / 7 mbar over normal distribution pressure
	25 in. w.c. to 2.5 psi 2.5 to 4.5 psi 4.5 to 7 psi	62 mbar to 0.17 bar 0.17 to 0.31 0.31 to 0.4	1B537127022 1B537227022 1B537327052	14 in. w.c. / 34 mbar over normal distribution pressure
	Type 627-109 pilot and 150 psig / 10.3 bar maximum allowable pilot inlet pressure for cast iron body or 750 psig / 51.7 bar maximum allowable pilot inlet pressure for malleable iron or steel body	5 to 20 15 to 40 35 to 80	0.34 to 1.4 1.0 to 2.8 2.4 to 5.5	10B3076X012 10B3077X012 10B3078X012
70 to 150 130 to 200		4.8 to 10.3 9.0 to 13.8	10B3079X012	5.0 psig / 0.34 bar over normal distribution pressure

2. To enable intermediate pressure adjustment with the working monitor regulator, slowly open the hand valve in the intermediate pressure control line.
3. To enable downstream pressure adjustment with the second-stage working regulator, slowly open the hand valve in the control line to this regulator.
4. Adjust the setting of the monitoring pilot to establish the desired emergency downstream pressure, which is to be maintained in the event of open failure of the second-stage working regulator. The emergency downstream pressure should exceed the desired downstream pressure by at least the amount listed in Table 7. The steps followed to set the monitoring pilot may vary with each piping situation; however, the basic method remains the same. The following sub steps a and b may be used as examples for setting the monitoring pilot:
  - a. Increase the outlet pressure setting of the second-stage working regulator until the monitoring pilot takes control of the downstream pressure. Adjust the monitoring pilot setting until the desired emergency downstream pressure is achieved. Then, readjust the second-stage working regulator to establish the desired downstream pressure.
  - b. Install special piping (not shown in Figure 7) so that the monitoring pilot senses the intermediate pressure. The intermediate pressure then appears to the monitoring pilot as if it was increased downstream pressure and the monitoring pilot controls and reduces the intermediate pressure. Adjust the monitoring pilot setting until the desired emergency downstream pressure is achieved at the intermediate pressure stage. Then slowly close the special piping and open up the monitoring downstream control line for normal service.
5. Slowly open the downstream block valve.
6. Slowly close the bypass valve, if any.

# Types 1098-EGR and 1098H-EGR

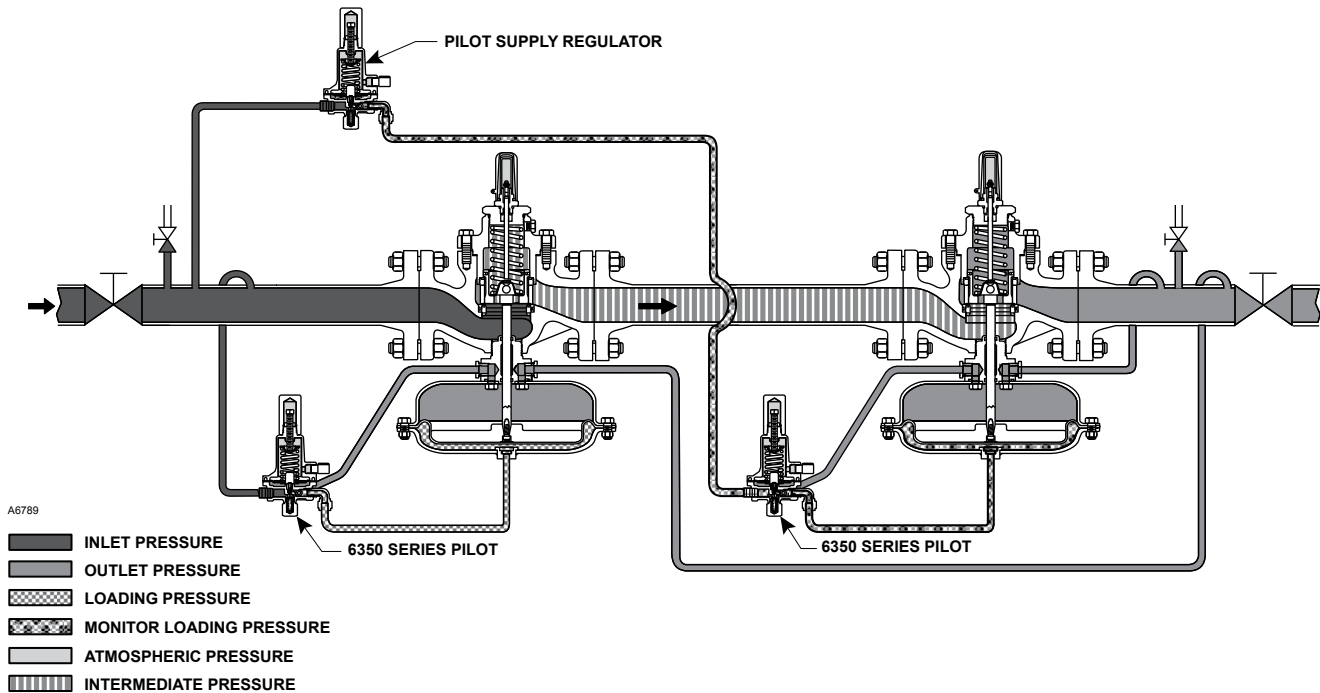


Figure 8. Typical Wide-Open Monitor Installations

## NOTICE

### Adjustment Recommendations for Monitor Applications

Low amplitude/high frequency monitor trim oscillations can occur if the monitor regulator pressure setting is adjusted too closely to the working regulator pressure setting and/or if the monitor pilot supply regulator pressure setting is adjusted too closely to the monitor regulator pressure setting. The monitor pressure setting should be adjusted so it is at minimum two times the pilot proportional band pressure above the working regulator pressure setting. The monitor pilot supply pressure setting should be adjusted so it is at minimum 5 psig / 0.34 bar plus the monitor minimum differential pressure above the working regulator pressure setting. These adjustments must be made such that other governing pressure limits, such as casing ratings, pilot maximum differential pressures or regulatory limits, are not exceeded.

### Wide-Open Monitor (Figure 8)

Either the upstream or downstream regulator can be the monitor regulator. During normal operation, the monitoring regulator is standing wide open with the reduction to distribution pressure being taken across the working regulator. Only in case of open failure of the working regulator does the wide open monitoring regulator take control at its slightly higher setting.

Regardless of which regulator is used as the monitor, it should be equipped with a pilot supply regulator set to limit the pilot supply pressure to 10 to 15 psig / 0.69 to 1.0 bar above control pressure. Since the pilot on the monitoring regulator is wide open during normal operation, the pilot supply regulator prevents differential relief valve chatter on the monitoring regulator pilot.

### Installation

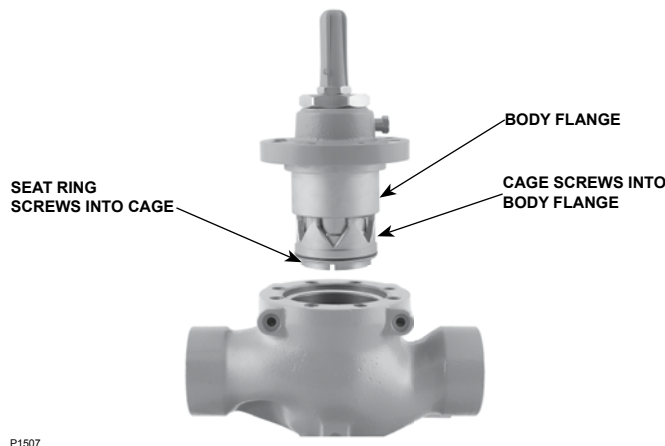
1. For both the wide-open monitoring regulator and the working regulator, perform the Standard Single-Pilot Regulator Installation section through step 6.
2. Connect the control line of the wide-open monitoring regulator (Figure 8) to downstream piping near the working regulator control line connection. During normal operation the wide-open monitoring regulator stands wide-open with the pressure reduction being taken across the working regulator. Only in case of working regulator failure does the wide-open monitoring regulator take control at its slightly higher setting.

### Startup

Repeat this procedure in turn for each regulator in the installation.

1. Slowly open the pilot supply line hand valve.
2. Slowly open the upstream block valve and partially open the downstream block valve for minimum flow.

# Types 1098-EGR and 1098H-EGR



**Figure 9.** Trim Package Removal

3. Slowly open the hand valve in the control line and adjust the pilot setting if necessary. Set the monitoring regulator at a slightly higher control pressure than the working regulator.
4. Completely open the downstream block valve.
5. Slowly close the bypass valve, if any.

## Shutdown

Installation arrangements vary, but in any installation it is important that the valves be opened or closed slowly and that the outlet pressure be vented before venting inlet pressure to prevent damage caused by reverse pressurization of the pilot or main valve. The following steps apply to the typical installation as indicated.

## Single-Pilot, Dual-Pilot Regulator or Wide-Open Monitor

As well as applying to a single-pilot regulator (Figure 3), the steps in this procedure are also valid for a dual-pilot regulator (Figure 4) or a wide-open monitoring installation (Figure 8) and just need to be repeated for each regulator in such an installation.

1. Slowly close the downstream block valve. If the control line is downstream of the block valve, also close the hand valve in the control line.
2. Slowly close the upstream block valve and the hand valve in the pilot supply line.
3. Slowly open the vent valve in the downstream pipeline. If the control line is downstream of the block valve, also open the vent valve in the control line. Permit all pressure to bleed out.



**Figure 10.** Seat Ring / Cage Removal or Installation Using Body as Holding Fixture

4. Slowly open the upstream pipeline vent valve. Allow all pressure to bleed out of both the piping and the pilot.

## Working Monitor

1. Slowly close the downstream block valve and the hand valve in the downstream pressure control line.
2. Slowly close the upstream block valve and the hand valves in both pilot supply lines.
3. Slowly open all vent valves and permit all pressures to bleed out of the piping and regulators.

## Maintenance

Regulator parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and replacement of parts depends upon the severity of service conditions or the requirements of local, state and federal regulations. Due to the care Emerson™ takes in meeting all manufacturing requirements (heat treating, dimensional tolerances, etc.), use only replacement parts manufactured or furnished by Emerson.

The stem O-rings (key 6, Figure 14) on the Type 1098 or 1098H actuator can be lubricated during regularly scheduled maintenance, using the grease fitting (key 28, Figure 14). Stem O-rings can be checked for damage during normal operation by line pressure leakage or unexpected grease extrusion from the actuator vent (key 27, Figure 14). All O-rings, gaskets and seals should be lubricated with a good grade of general-purpose grease and installed gently rather than forced into position. Be certain that the nameplates

# Types 1098-EGR and 1098H-EGR

(key 13, Figure 14) are updated to accurately indicate any field changes in equipment, materials, service conditions or pressure settings.



## WARNING

**To avoid personal injury resulting from sudden release of pressure, isolate the regulator from all pressure and cautiously release trapped pressure from the regulator before attempting disassembly.**

## Type EGR Main Valve

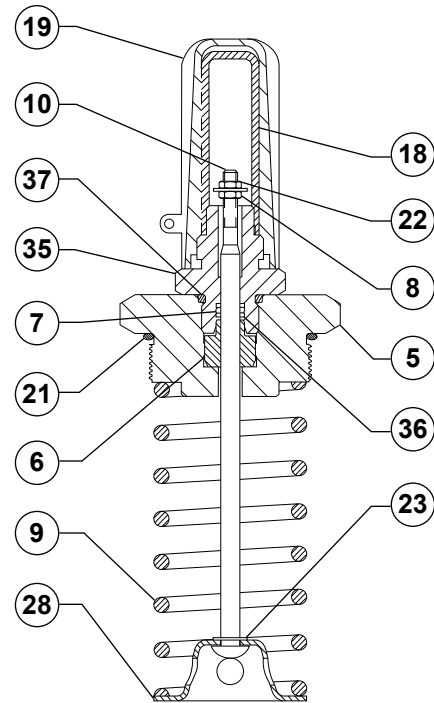
### Replacing Quick-Change Trim Package

Perform this procedure if the entire trim package is replaced. Key numbers for both the complete main valve and its trim package are referenced in Figures 12 and 13. Some replacement trim package assembly numbers are listed in a table in the parts list.

#### Note

**All disassembly, trim change and reassembly steps in this section may be performed with the regulator in the main line and without disconnecting the pilot supply or control lines.**

1. Remove the cap screws (key 3) with a cast iron body or remove the hex nuts (key 29, not shown) with a steel body. Pry the body flange (key 2) from the valve body (key 1) and lift out the trim package.
2. Perform any required inspection, cleaning or maintenance on the exposed surfaces of the valve body (key 1) or trim package. Replace the gasket (key 4) or cage O-ring (key 17) as necessary.
3. On a pre-built replacement trim package, check indicator zeroing by unscrewing the indicator protector (key 19) and seeing if the flange of the indicator nut (key 22) lines up evenly with the bottom marking on the indicator scale (key 18). If not, remove the indicator scale and separate the indicator nut and hex nut (key 8). Hold the indicator scale against the indicator fitting (key 5) with the scale base resting against the shoulder of the fitting and turn the indicator nut until its flange is aligned with the bottom scale marking. Then lock both nuts against each other and install the indicator scale and protector.



**Figure 11.** Types 1098-EGR and 1098H-EGR Travel Indicator Assembly

4. Coat the cage seating surface of the valve body (key 1) web and the body flange (key 2) seating surfaces of the valve body neck with a good grade of general-purpose grease. Install the trim package and secure it evenly with the cap screws (key 3) or stud bolt nuts (key 29, not shown).

No particular trim package orientation in the body is required.

### Replacing Travel Indicator Assembly

The Types 1098-EGR and Type 1098H-EGR travel indicator assemblies now incorporate a redesigned O-ring retainer (key 6), Polytetrafluoroethylene (PTFE) backup rings (key 36) and an additional indicator fitting (key 35).

When performing maintenance on the original Type 1098-EGR or 1098H-EGR body flange, travel indicator replacement is recommended. The redesigned travel indicator assembly is incorporated into all Quick-Change Trim Kits (e.g. 25A3170X012) and on the Travel Indicator Kits (see table by size). The elastomer repair kits contain the components for the redesigned travel indicator assembly.

# Types 1098-EGR and 1098H-EGR

Type EGR Main Valve Cap Screw (key 3) Torque

SIZE		TORQUE	
NPS	DN	Ft-lbs	N•m
1	25	75 to 95	102 to 129
2	50	55 to 70	75 to 95
3	80	100 to 130	136 to 176
4	100	160 to 200	217 to 271
6, 8 x 6, 12 x 6	150, 200 x 150, 300 x 150	275 to 300	373 to 407

1. Remove the travel indicator assembly by removing lower indicator fitting (key 5) from the body flange (key 2).
2. Coat the threads of the lower indicator fitting (key 5) with a good grade of general-purpose grease.
3. Install travel indicator assembly (10C1212), torque to 40 ft-lbs / 54 N•m.
4. Check indicator zeroing by unscrewing the indicator protector (key 19) and seeing if the flange of the indicator nut (key 22) lines up evenly with the bottom marking on the indicator scale (key 18). If not, remove the indicator scale and separate the indicator nut and hex nut (key 8). Hold the indicator scale against the indicator fitting (key 5) with the scale base resting against the shoulder of the fitting and turn the indicator nut until its flange is aligned with the bottom scale marking. Then lock both nuts against each other and install the indicator scale and protector.

## Replacing Trim Parts

Perform this procedure when inspecting, cleaning or replacing individual trim package parts. Key numbers are referenced in Figures 12 and 13.

### Note

**Access to the spring (key 9), flange O-ring, travel indicator parts or optional travel stop (key 32) in step 1 can be gained without removing the body flange (key 2).**

1. Remove the indicator fitting (key 5) and attached parts. Proceed to step 5 if only maintenance on the fitting or attached parts is performed.

2. Remove the cap screws (key 3) on a cast iron body or remove the hex nuts (key 29, not shown) on a steel body and pry the body flange (key 2) loose from the valve body (key 1).
3. Use the valve body (key 1) as a holding fixture if desired. Flip the body flange (key 2) over and anchor it on the valve body as shown in Figure 10, removing the pipe plug (key 31) first if necessary.
4. To gain access to the port seal (key 12), upper seal (key 15) or valve plug (key 16) part, unscrew the seat ring (key 13) from the cage (key 11) and the cage from the body flange (key 2). For leverage, a wrench handle or similar tool may be inserted into the seat ring slots (Figure 10) and a strap wrench may be wrapped around a standard or a Whisper Trim™ Cage or a soft bar may be inserted through the windows of a standard cage. To remove the piston ring (key 14) and/or plug O-ring (key 20), remove the valve plug (key 16) from the body flange, insert a screwdriver into the precut fold over area of the piston ring and unfold the piston ring. Proceed to step 6 if no further maintenance is necessary.
5. To replace the body flange (key 2) or gain access to the spring (key 9), indicator stem (key 10), stem O-ring (key 7), spring seat (key 28), E-ring (key 23) or optional travel stop (key 32), remove the indicator protector (key 19) and indicator scale (key 18). Since some compression is left in the spring, carefully remove the flanged nut (key 22) and hex nut (key 8). A screwdriver may be inserted through the press-fit bushing (key 6) to remove the stem O-ring without removing the bushing. If necessary, unscrew the travel stop (if used) and unclip the E-ring from the indicator stem.
6. Replace and lubricate parts such as the gasket (key 4) and cage O-ring (key 17) as necessary, making sure that if the port (key 12) and upper seals (key 15) were removed they are installed in their retaining slots with the grooved sides facing out. Also lubricate any other surfaces as necessary for ease of installation. No further main valve maintenance is necessary if just the indicator fitting (key 5) and attached parts were removed.
7. Install the plug O-ring (key 20) and piston ring (key 14) onto the valve plug (key 16). Insert the valve plug into the body flange (key 2), install the cage (key 11) plus upper seal (key 15) and O-ring (key 17) into the body flange and then install the seat ring (key 13) plus port seal (key 12) into the



cage. Apply a thin coating of lubricant to seals for protection during assembly. Use the valve body (key 1) as a holding fixture during this step as shown in Figure 10 and insert a wrench handle (or similar tool) into the seat ring slots for leverage when tightening the seat ring and cage.

8. Remove the upside-down body flange (key 2) if it was anchored on the body. Coat the cage (key 11) seating surfaces of the valve body (key 1) web and the body flange (key 2) seating surfaces of the valve body neck with a good grade of general-purpose grease. Install the body flange on the body and secure it evenly with the cap (key 3) screws or stud bolt nuts (key 29, not shown). Except on the NPS 1 / DN 25 body, which does not use it, the pipe plug (key 31) must be installed in the side tapping of the flange for proper operation.
9. Make sure that the flange (key 2) and stem O-rings (key 7) and the bushings are installed in the indicator fitting (key 5). Orient the spring seat (key 28) as shown in Figure 12 and attach it with the E-ring (key 23) to the slotted end of the indicator stem (key 10). Install the travel stop (key 32) (if used) on the spring seat and then install the spring (key 9).
10. Being careful not to cut the stem O-ring (key 7) with the stem threads, install the indicator fitting (key 5) down over the indicator stem (key 10) until resting on the spring (key 9). Install the hex nut (key 8) and then the flanged indicator nut (key 22) on the indicator stem, pushing on the fitting if necessary to provide sufficient stem thread exposure. To maintain clearance for indicator part installation, draw up the spring seat (key 28) by turning the hex nut down on the stem until the threads bottom.
11. Install the indicator fitting (key 5) with attached parts into the body flange (key 2). Back the hex nut off until the spring completely closes the valve plug (key 16) against the port (key 12) and upper seals (key 15), as indicated by stem threads showing between this nut and the fitting. Hold the indicator scale (key 18) against the fitting with the scale base resting against the shoulder of the fitting and turn the indicator nut (key 22) until its flange is aligned with the bottom scale marking. Then lock both nuts against each other and install the indicator scale and protector (key 19).

## P590 Series Filter

Perform this procedure to clean or replace filter parts in a standard Type P593-1 or P594-1 filter assembly. Remove the following (as shown in Figure 15): filter body (key 1), machine screw (key 4), gasket (key 7), two flat washers (key 5) and filter element (key 2).

Upon reassembly, one of the flat washers must go between the filter element and filter head (key 3) and the other must go between the filter element and gasket. Use a good grade of pipe thread sealant on the filter head pipe threads.

## Type 6351 Pilot

Perform this procedure if changing the control spring for one of a different range or if inspecting, cleaning or replacing any other pilot parts. Pilot key numbers are referenced in Figure 16 and mounting key numbers in Figure 24, 25, 26 or 28.

### Note

**The body assembly (key 1) may remain on the pipe nipple (key 23, Figure 24 or key 39, Figure 28) unless the entire pilot is replaced. The optional bonnet (key 2) for a Type 662 electric remote control drive unit may remain installed during maintenance.**

1. To gain access to the diaphragm assembly (key 7), control spring (key 9) or spring seat (key 8), loosen the locknut (key 11, not used with Type 662 mounting) and turn the adjusting screw (key 10) counterclockwise until compression is removed from the spring. Remove the machine screws (key 12) and separate the body assembly (key 1) from the bonnet (key 2).
2. Inspect the removed parts and replace as necessary. Ensure the registration and bleed holes in the pilot body are free of debris. After assembly, make sure of the proper control spring setting according to the Startup section and remark the spring case if necessary.
3. To replace the valve plug (key 4), remove the body plug (key 3) to let the valve spring (key 6) and inner valve assembly (key 4) drop freely from the body (key 1). Inspect the removed parts, replace if necessary. Make sure the plug seating surfaces are free from debris. Inspect body plug O-ring (key 3), replace if necessary. Type 6351 pilots

# Types 1098-EGR and 1098H-EGR

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manufactured before May 1999 need to have the body plug gasket and the body plug replaced with a new body plug assembly (key 3), which includes the body plug and the body plug O-ring. Install the body plug O-ring over the body plug. Stack the valve spring and the inner valve assembly on the body plug assembly (key 3) and install the body plug assembly with stacked parts into the body.

## Types 6352 through 6354M Pilots

Perform this procedure if changing the control spring for one of a different range or if inspecting, cleaning or replacing any other pilot parts. Pilot part key numbers are referenced in Figure 17. Mounting key numbers are referenced in Figure 24 for single-pilot constructions and in Figures 26 and 28 for dual-pilot constructions.

### Note

**The body (key 1) may remain on the pipe nipple (key 23, Figure 24 or key 39, Figure 28) unless the entire pilot is replaced.**

1. To gain access to the diaphragm assembly (key 5), diaphragm limiter (key 23) if used, control spring (key 6), restriction (key 22), stem guide (key 8) or spring seat (key 7), remove the closing cap (key 11), loosen the locknut (key 10) and turn the adjusting screw (key 9) counterclockwise until compression is removed from the spring. Remove the machine screws (key 14) and separate the body from the spring case (key 2).
2. Inspect the removed parts and replace as necessary. Make sure the restriction and the registration hole in the body are free from debris. After assembly, make sure of the proper control spring setting according to the Startup section and remark the spring case if necessary.
3. To replace the valve plug (key 4) or bellows O-ring (key 17), remove the body plug (key 3) and body plug gasket (key 12). Be careful to keep the bellows assembly (key 16) from falling out and possibly getting lost while removing the valve plug. Inspect the removed parts and replace as necessary. Make sure the valve plug seating surfaces are free from debris.

## 61 Series Pilot and Type 1806 Relief Valve

Perform this procedure if changing the control spring for one of a different range or if inspecting, cleaning or replacing relief valve or any other pilot parts. Pilot part key numbers are referenced in Figures 18 and 19 and mounting part and relief valve key numbers in Figure 25.

1. Remove the pilot from the pipe nipple (key 24) unless just the control spring is to be changed.
2. To gain access to the control spring or other internal parts, remove the closing cap assembly (key 5) and relieve control spring (key 7) compression by turning the adjusting screw (key 6) counterclockwise. Change the control spring and install the adjusting screw and closing cap assembly if no other maintenance will be performed. Make sure of the proper control spring setting according to the Installation and Startup section and restamp the nameplate if necessary.
3. For any other internal maintenance, relieve control spring compression according to step 2. Then remove the cap screw (key 20) and separate the pilot into three sections: spring case (key 1), body (key 2) and bottom cover (key 3).
4. To inspect the two diaphragms (keys 14 and 15) thoroughly, remove the diaphragm nut (key 11), hex nut (key 19) and the upper and lower relay heads (keys 16 and 17). The projecting prong in the body may be used as the restraining member to keep the yoke (key 4) from turning while removing the nuts. Also inspect the O-ring (key 12) and replace any parts as necessary.
5. Take the yoke (key 4) and attached parts out of the body to examine the disk holder assembly (key 9). Remove the relay orifice (key 8) to check for clogging and replace if necessary.
6. To replace the disk holder assembly, first unscrew the bleed orifice (key 10). Remove it and the associated parts. Then unscrew the disk (key 9) holder assembly from the bleed valve (key 26) to gain access to the relay spring (key 13). Clean or replace any parts as necessary before reassembling.
7. Upon reassembly, pay particular attention to the following assembly suggestions:

# Types 1098-EGR and 1098H-EGR

- a. Before replacing the diaphragm case (key 2) or spring case (key 1), be sure the yoke assembly is positioned so that it will not bind or rub on the prong in the relay body.
- b. Avoid wrinkling the diaphragms (key 14 and 15) when replacing the diaphragm case (key 2) and spring case (key 1).
- c. Replace the diaphragm case (key 2), carefully working the upper relay diaphragm (key 14) into the recess in the diaphragm case. If the diaphragm case rocks with respect to the pilot body, the diaphragm is probably wrinkled.
- d. Replace the spring case (key 1), using care to smooth the lower relay diaphragm (key 15) evenly into the recess in the pilot body.
- e. Install the eight cap screws (key 20), tightening them down evenly in a crisscross pattern to avoid crushing the diaphragm. Recommended final torque on these cap screws is 10 to 12 ft-lbs / 14 to 16 N•m.
8. After assembly, make sure of the proper control spring setting according to the Installation and Startup section and restamp the nameplate (key 27) if necessary.
9. To gain access to the Type 1806 relief valve, disconnect the relief tubing at the connector fitting and unscrew the relief valve. Make sure the spring closes the ball or replace the relief valve if necessary. Install the relief valve back in the pipe tee (key 16) and reconnect the relief tubing (key 18) and connector fitting.
3. Inspect and replace the orifice (key 5) if necessary. Protect the orifice seating surface during disassembly and assembly. Lubricate the threads of the replacement orifice with proper amount of anti-seize lubricant and install with 29 to 38 ft-lbs / 39 to 52 N•m of torque.
4. To replace the disk assembly (key 13), remove the cotter pin (key 15). If not necessary, skip to step 7.
5. Install the disk assembly (key 13) and secure it with the cotter pin (key 15).
6. Place backup ring (key 48) into the body (key 1). Then place the body seal O-ring (key 11) into the body.
7. Place the diaphragm casing (key 4) on the body (key 1). Secure the diaphragm casing to the body with the cap screws (key 2) using 7 to 9 ft-lbs / 9.5 to 12 N•m.

## *Diaphragm and Spring Case Area*

This procedure is for gaining access to the spring, diaphragm, lever assembly stem and Type Y600AM stem O-ring. All pressure must be released from the diaphragm casing before performing these steps.

1. Remove the closing cap (key 22) and turn the adjusting screw (key 35) counterclockwise to remove the compression from the spring (key 6).
2. If the only maintenance is to change the control spring, take out the control spring and replace with the desired spring. Turn the adjusting screw (key 35) clockwise to compress the spring to the desired outlet pressure setting according to the Installation and Startup section and restamp the nameplate if necessary. Skip to step 11.
3. If further maintenance to the internal diaphragm casing parts is required, remove the hex nuts (key 23, not shown) and cap screws (key 24). Remove the diaphragm (key 10) plus attached parts by tilting them so that the pusher post (key 8) slips off the lever assembly (key 16). To separate the diaphragm from the attached parts, unscrew the cap screw (key 38) from the pusher post (key 8). If the only maintenance needed is to replace the diaphragm parts, skip to step 7.

## **Type Y600AM Pilot**

### *Body Area*

This procedure is for gaining access to the disk assembly, orifice and body O-ring. All pressure must be released from the diaphragm casing and the disk assembly must be open, before these steps can be performed. Part key numbers are referenced in Figure 21.

1. Remove the cap screws (key 2) and separate the diaphragm casing (key 4) from the body (key 1).
2. Remove and inspect the body seal O-ring (key 11) and the backup ring (key 48).

# Types 1098-EGR and 1098H-EGR

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4. To replace the lever assembly (key 16), remove the machine screws (key 17). To replace the stem (key 14) or stem O-ring (key 30), also perform Body Area Maintenance procedure steps 1 and 4 and pull the stem (key 14) out of the diaphragm casing (key 4). Grease the replacement stem O-ring (key 30) with a good grade of lubricant and install it on the stem (key 14).
5. Install the stem (key 14) into the diaphragm casing (key 4) and perform Body Area Maintenance procedure steps 6 through 8 as necessary.
6. Install the lever assembly (key 16) into the stem (key 14) and secure the lever assembly with the machine screws (key 17).
7. Hold the pusher post (key 8) and place diaphragm assembly parts on the pusher post in the following order: diaphragm (key 10), diaphragm head (key 7), lower spring seat (key 50) and washer (key 36) and secure with diaphragm cap screw (key 38) using 7 to 9 ft-lbs / 9.5 to 12 N•m of torque.
8. Install the pusher post (key 8) and attached parts onto the lever (key 16).
9. Install the control spring (key 6) and spring case (key 3) on the diaphragm casing (key 4) so that the vent assembly (key 26) is correctly oriented and secure them with the cap screws (key 24) and hex nuts (key 23) to finger tightness only.
10. Turn the adjusting screw (key 35) clockwise until there is enough control spring (key 6) force to provide proper slack to the diaphragm (key 10). Using a crisscross pattern, finish tightening the cap screws (key 24) and hex nuts to 5 to 6 ft-lbs / 6.8 to 8.1 N•m of torque. Finish turning the adjusting screw to the desired outlet pressure setting.
11. Install the closing cap (key 22).
1. Unscrew the valve plug guide (key 5) from the body (key 1). The valve plug spring (key 10) and the valve plug (key 4) will normally come out of the body along with the valve plug guide.
2. Inspect the seating surface of the valve plug (key 4), being sure that the composition surface (or polished steel surface) of the valve plug is not damaged. Replace if damaged.
3. Inspect the seating edge of the orifice (key 3). If damaged, unscrew the orifice from the body and replace it with a new part. If no further maintenance is required, reassemble the regulator in the reverse of the above steps. When installing the valve plug guide (key 5) coat the threads and sealing surface with sealant to ensure an adequate metal-to-metal seal.
4. To inspect the diaphragm (key 12) or other internal parts, loosen the locknut (key 17) and turn the adjusting screw (key 15) to remove all spring compression.
5. Remove the diaphragm case cap screws (key 16) and lift off the spring case (key 2). Remove the upper spring seat (key 9) and regulator spring (key 11). Remove the lower spring seat (key 8).
6. Remove the diaphragm (key 12) and examine for damage. Replace if damaged.
7. With diaphragm removed, check to be sure the pressure registration hole is completely open and free of all obstructions.
8. Reassemble in reverse order of the previous steps. Lubricate the upper spring seat (key 9) and the exposed threads of the adjusting screw (key 15). Before tightening cap screws (key 16) be sure to install the adjusting screw, if completely removed and turn it down to obtain diaphragm slack. This allows proper positioning of the diaphragm to permit full travel of the valve plug (key 4). Complete reassembly procedures and temporarily install a gauge in place of the pipe plug (key 52). Turn the adjusting screw to produce the desired outlet pressure values shown in Table 2. Tighten the locknut to maintain the desired setting.

## Type 95H Supply Pressure Regulator

This section includes instructions for disassembly and assembly of replacement parts. All key numbers refer to Figure 23.

# Types 1098-EGR and 1098H-EGR

## Types 1098 and 1098H Actuator and Pilot Mounting Parts

Perform this procedure if changing the actuator or inspecting, cleaning or replacing actuator and/or pilot mounting parts. Actuator part key numbers are referenced in Figure 14 and mounting part numbers in Figure 27, unless otherwise indicated.

1. The actuator and pilot(s) may be removed and replaced as a unit by disconnecting the control line and pilot supply line.
2. Access to all internal parts except the stem O-rings, bearings and wiper (keys 6, 56 and 57) may be gained without removing the bonnet (key 3) or upper diaphragm case (key 2) from the main valve or the pilot(s) from the bonnet pipe nipple (key 23, Figure 24 or keys 37 and 39, Figure 28). Disconnect the loading tubing (key 24, Figure 24, 26 or 28) from the actuator elbow fitting (key 25, Figure 24 or key 41, Figure 28) and with a Type 61LD pilot also disconnect the relief tubing (key 18, Figure 25) from the fitting tee.
3. Remove the cap screws (key 10), nuts (key 11), lower diaphragm case (key 1), diaphragm (key 7) and diaphragm plate (key 8). To separate the stem (key 12) from the diaphragm plate (key 8), remove the stem cap screw (key 9).
4. **To remove the Type 1098 case O-ring** (key 5), unscrew the four case cap screws (key 4), remove the upper diaphragm case (key 2) and remove the case O-ring.  
  
**To remove the Types 1098 and 1098H stem O-rings** (key 6), remove the pilot(s) and pipe nipple(s) if necessary. Unscrew either the Type 1098 bonnet (key 3) or the Type 1098H upper diaphragm case (key 2) and remove the wiper ring, bearings and O-rings.
5. Lubricate both stem O-rings (key 6) and wiper ring (key 57) and install them with the stem bearings (key 56) in either the Type 1098 bonnet (key 3) or in the Type 1098H upper diaphragm case (key 2).

**For the Type 1098H actuator**, thread the upper diaphragm casing (key 2) into the main valve body.

**For the Type 1098 actuator**, lubricate the case O-ring (key 5) and install it in the bonnet (key 3). Line up the holes in the upper diaphragm casing (key 2) and the bonnet; insert and tighten the four case cap screws (key 4) to secure the parts together. Thread the bonnet into the main valve body.

6. Secure the diaphragm plate (key 8) to the stem (key 12) with the stem cap screw (key 4). Lay the entire diaphragm (key 7), diaphragm plate and stem assembly into the lower diaphragm case (key 1) so the diaphragm convolution laps up over the diaphragm plate according to Figure 14. Then install the stem slowly up into the bonnet (key 3) to prevent stem or O-ring damage and secure the lower diaphragm case to the upper diaphragm case (key 2) with the cap screws and nuts. Tighten the cap screws and nuts evenly in a crisscross pattern to avoid crushing the diaphragm.
7. Grease the stem O-rings through the zerk fitting (key 28) until excess grease emerges from the vent (key 27).
8. Install the pipe nipple(s) and pilot(s) if they were removed during maintenance. Connect the actuator loading tubing if it was disconnected.

## Parts Ordering

Each Type 1098-EGR or 1098H-EGR regulator is assigned a serial number or FS number which can be found on the nameplates. Refer to this number when contacting your local Sales Office for assistance or when ordering replacement parts.

When ordering a replacement part, be sure to include the complete 11-character part number from the following parts list. Some commonly used trim packages can be ordered according to the 11-character assembly number given in the parts kits listed in the Parts List.

## Parts List

### Note

**Except where indicated, sizes shown are valve body sizes.**

# Types 1098-EGR and 1098H-EGR

## Parts List (continued)

### Type EGR Main Valve (Figures 12 and 13)

Key	Description	Part Number	Key	Description	Part Number
	Elastomer Trim Parts kit (included are: keys 4, 7, 12, 14, 15, 17, 20, 21, 36 and 37)			Cast Iron Body Flange (continued)	
	Nitrile (NBR)			NPS 3 / DN 80	25A3170X172
	NPS 1 / DN 25	R63EGX00112		NPS 4 / DN 100	25A3170X242
	NPS 2 / DN 50	R63EGX00122		NPS 6 / DN 150	25A3170X312
	NPS 3 / DN 80	R63EGX00132		Steel Body Flange	
	NPS 4 / DN 100	R63EGX00142		NPS 1 / DN 25	25A3170X442
	NPS 6 / DN 150	R63EGX00162		NPS 2 / DN 50	25A3170X332
	Fluorocarbon (FKM)			NPS 3 / DN 80	25A3170X472
	NPS 1 / DN 25	R63EGXFK112		NPS 4 / DN 100	25A3170X502
	NPS 2 / DN 50	R63EGXFK122		NPS 6 / DN 150	25A3170X522
	NPS 3 / DN 80	R63EGXFK132		NPS 8 x 6 / DN 200 x 150	25A3170X552
	NPS 4 / DN 100	R63EGXFK142		Parts Kit, Quick Change Travel Indicator Kit	
	NPS 6 / DN 150	R63EGXFK162		(included are: keys 10, 6, 35, 5, 8, 7 and 36 (2 required); keys 21, 18, 22, 23, 37, 19, 28 and 9)	
	Ethylene propylene (EPR)			60 psi / 4.1 bar spring color green	
	NPS 1 / DN 25	R63EGXEP112		NPS 1 / DN 25	10C1212X042
	NPS 2 / DN 50	R63EGXEP122		NPS 2 / DN 50	10C1212X012
	NPS 3 / DN 80	R63EGXEP132		NPS 3 / DN 80	10C1212X022
	NPS 4 / DN 100	R63EGXEP142		NPS 4 / DN 100	10C1212X032
	NPS 6 / DN 150	R63EGXEP162		NPS 6 / DN 150	10C1212X052
	Actuator Parts kit (included are: keys 5, 6, 7, 56 and 57)			125 psi / 8.6 bar spring color blue	
	Size 30			NPS 1 / DN 25	10C1212X092
	Nitrile (NBR)	R1098X00302		NPS 2 / DN 50	10C1212X062
	Fluorocarbon (FKM)	R1098X00502		NPS 3 / DN 80	10C1212X072
	Size 40			NPS 4 / DN 100	10C1212X082
	Nitrile (NBR)	R1098X00402		NPS 6 / DN 150	10C1212X102
	Fluorocarbon (FKM)	R1098X00602		400 psi / 27.6 bar spring color red	
	Size 70			NPS 1 / DN 25	10C1212X142
	Nitrile (NBR)	R1098X00702		NPS 2 / DN 50	10C1212X112
	Quick Change Trim Kit (see Figure 13 for included keys)			NPS 3 / DN 80	10C1212X122
	60 psi / 4.1 bar spring color green			NPS 4 / DN 100	10C1212X132
	Cast Iron Body Flange			NPS 6 / DN 150	10C1212X152
	NPS 1 / DN 25	25A3170X012			
	NPS 2 / DN 50	25A3170X102			
	NPS 3 / DN 80	25A3170X152	1	Valve Bodies	See following table
	NPS 4 / DN 100	25A3170X222	2	Body Flange	
	NPS 6 / DN 150	25A3170X272		Cast iron, ENC <sup>(1)</sup>	
	Steel Body Flange			NPS 2 / DN 50	25A3168X012
	NPS 1 / DN 25	25A3170X422		NPS 3 / DN 80	24A9034X012
	NPS 2 / DN 50	25A3170X452		NPS 4 / DN 100	25A2309X012
	NPS 3 / DN 80	25A3170X372		NPS 6, 8 x 6 or 12 x 6 /	
	NPS 4 / DN 100	25A3170X482		DN 150, 200 x 150 or 300 x 150	34A8172X012
	NPS 6 / DN 150	25A3170X512		WCC steel, ENC, heat-treated <sup>(1)</sup>	
	NPS 8 x 6 / DN 200 x 150	25A3170X532		NPS 1 / DN 25	24A6779X012
	125 psi / 8.6 bar spring color blue			NPS 2 / DN 50	25A2254X012
	Cast Iron Body Flange			NPS 3 / DN 80	25A2300X112
	NPS 1 / DN 25	25A3170X032		NPS 4 / DN 100	24A9032X012
	NPS 2 / DN 50	25A3170X082		NPS 6, 8 x 6 or 12 x 6 /	
	NPS 3 / DN 80	25A3170X142		DN 150, 200 x 150 or 300 x 150	34A7152X012
	NPS 4 / DN 100	25A3170X192		CF8M Stainless steel, ENC (NACE)	
	NPS 6 / DN 150	25A3170X282		NPS 1 / DN 25	24A6779X062
	Steel Body Flange			NPS 2 / DN 50	25A2254X082
	NPS 1 / DN 25	25A3170X432		NPS 3 / DN 80	25A2300X012
	NPS 2 / DN 50	25A3170X382		NPS 4 / DN 100	24A9032X042
	NPS 3 / DN 80	25A3170X462		NPS 6, 8 x 6 or 12 x 6 /	
	NPS 4 / DN 100	25A3170X492		DN 150, 200 x 150 or 300 x 150	34A7152X052
	NPS 6 / DN 150	25A3170X342	3	Cap Screw, plated steel (use with cast iron and steel body)	
	NPS 8 x 6 / DN 200 x 150	25A3170X542		NPS 1 / DN 25 (4 required)	1R281124052
	400 psi / 27.6 bar spring color red			NPS 2 / DN 50 (8 required)	1A453324052
	Cast Iron Body Flange			NPS 3 / DN 80 (8 required)	1A454124052
	NPS 1 / DN 25	25A3170X052		NPS 4 / DN 100 (8 required)	1A485724052
	NPS 2 / DN 50	25A3170X112		NPS 6, 8 x 6 or 12 x 6 /	
				DN 150, 200 x 150 or 300 x 150 (12 required)	1U513124052

1. Part included in trim package assembly can be ordered according to the parts kit trim package.

# Types 1098-EGR and 1098H-EGR

Key 1, Type EGR Main Valve Bodies

MATERIAL	END CONNECTION	NPS 1 / DN 25	NPS 2 / DN 50
Cast Iron	NPT	34B7611X012	38A8845X012
	CL125 FF	34B8630X012	38A8847X012
	CL250 RF	37B5950X012	38A8846X012
WCC Steel	NPT	37B5946X012	38A8848X012
	CL150 RF	37B5947X012	38A8853X012
	CL300 RF	37B5948X012	38A8849X012
	CL600 RF	37B5949X012	38A8844X012
	SWE	GE05951X012	GE05958X012
	SCH 40 BWE	GE05953X012	GE05957X012
	SCH 80 BWE	GE05954X012	GE05959X012
	PN 16/25/40	GE05956X012	GE05960X012
CF8M Stainless steel / NACE	NPT	37B5946X032	38A8848X032
	CL150 RF	37B5947X032	38A8853X072
	CL300 RF	37B5948X032	38A8849X032
	CL600 RF	37B5949X032	38A8844X032
	SWE	GE05951X022	GE05958X022
	SCH 40 BWE	GE05953X022	GE05957X022
	SCH 80 BWE	GE05954X022	GE05959X022
	PN 16/25/40	GE05956X022	GE05960X022
NACE WCC Steel	NPT	-----	38A8848X022
	CL150 RF	37B5947X022	38A8853X052
	CL300 RF	37B5948X022	38A8849X022
	CL600 RF	37B5949X022	38A8844X022

Key 1, Type EGR Main Valve Bodies (continued)

MATERIAL	END CONNECTION	NPS 3 / DN 80	NPS 4 / DN 100	NPS 6 / DN 150	NPS 8 x 6 / DN 200 x 150
Cast Iron	CL125 FF	38A8851X012	38A8865X012	38A8875X012	-----
	CL250 RF	38A8850X012	38A8854X012	38A7110X012	-----
WCC Steel	CL150 RF	38A8872X012	38A8867X012	38A7115X012	GE05973X012
	CL300 RF	38A8871X012	38A8869X012	38A8873X012	GE05974X012
	CL600 RF	38A8852X012	38A8866X012	38A8874X012	GE05975X012
	SCH 40 BWE	GE05962X012	GE05967X012	GE05971X012	-----
	SCH 80 BWE	GE05963X012	GE05968X012	GE05970X012	-----
	PN 16	GE05965X012	GE05969X012	GE05972X012	-----
CF8M Stainless steel / NACE	CL150 RF	38A8872X052	38A8867X042	38A7115X032	-----
	CL300 RF	38A8871X052	38A8869X032	38A8873X032	-----
	CL600 RF	38A8852X042	38A8866X032	38A8874X032	-----
	SCH 40 BWE	GE05962X022	GE05967X022	GE05971X022	GE05976X022
	SCH 80 BWE	GE05963X022	GE05968X022	GE05970X022	-----
	PN 16	GE05965X022	GE05969X022	GE05972X022	-----
NACE WCC Steel	CL150 RF	38A8872X062	38A8867X032	38A7115X022	GE05973X022
	CL300 RF	38A8871X042	38A8869X022	38A8873X022	GE05974X022
	CL600 RF	38A8852X032	38A8866X022	38A8874X022	GE05975X022

# Types 1098-EGR and 1098H-EGR

## Type EGR Main Valve (Figures 12 and 13) (continued)

Key	Description	Part Number	Key	Description	Part Number
3	Stud Bolt, Stainless steel (use with Stainless steel body) (not shown)		10 <sup>(1)</sup>	Travel Indicator Stem (continued)	
	NPS 1 / DN 25 (4 required)	1R284835222		316 Stainless steel (NACE)	
	NPS 2 / DN 50 (8 required)	1K242935222		NPS 1 / DN 25	T14311T0022
	NPS 3 / DN 80 (8 required)	1A378135222		NPS 2 / DN 50	T14275T0022
	NPS 4 / DN 100 (8 required)	1R369035222		NPS 3 / DN 80	T14312T0022
	NPS 6, 8 x 6 or 12 x 6 /			NPS 4 / DN 100	T14313T0022
	DN 150, 200 x 150 or 300 x 150 (12 required)	1A365635222		NPS 6, 8 x 6 or 12 x 6 /	
				DN 150, 200 x 150 or 300 x 150	T14314T0022
4 <sup>(1)</sup>	Gasket, composition		11	Cage	
	NPS 1 / DN 25	14A6785X012		Linear <sup>(1)</sup> , CF8M Stainless steel (NACE)	
	NPS 2 / DN 50	14A5685X012		NPS 1 / DN 25	34B4136X012
	NPS 3 / DN 80	14A5665X012		NPS 2 / DN 50	34B5838X012
	NPS 4 / DN 100	14A5650X012		NPS 3 / DN 80	34B5839X012
	NPS 6, 8 x 6 or 12 x 6 /			NPS 4 / DN 100	34B5840X012
	DN 150, 200 x 150 or 300 x 150	14A6984X012		NPS 6, 8 x 6 or 12 x 6 /	
				DN 150, 200 x 150 or 300 x 150	34B5841X012
5 <sup>(1)</sup>	Travel Indicator Fitting			Whisper Trim®	
	Zinc-plated steel			416 Stainless steel	
	NPS 1 / DN 25	T21117T0012		NPS 1 / DN 25	24A2043X012
	NPS 1 / DN 25 (NACE)	T21117T0022		NPS 2 / DN 50	24A5707X012
	NPS 2, 3 or 4 / DN 50, 80 or 100	T21107T0012		NPS 3 / DN 80	24A5708X012
	NPS 6, 8 x 6 or 12 x 6 /			NPS 4 / DN 100	24A5709X012
	DN 150, 200 x 150 or 300 x 150 (NACE)	T21120T0012		NPS 6, 8 x 6 or 12 x 6 /	
	316-A Stainless steel			DN 150, 200 x 150 or 300 x 150	24A8174X012
	NPS 2, 3 or 4 / DN 50, 80 or 100 (NACE)	T21107T0022		316 Stainless steel, ENC	
6 <sup>(1)</sup>	O-ring Retainer			NPS 1 / DN 25	24A2043X022
	416 Stainless steel (NACE)	T14276T0012		NPS 2 / DN 50	24A5707X022
7 <sup>(1)</sup>	Travel Indicator Stem O-ring			NPS 3 / DN 80	24A5708X042
	Nitrile (NBR) <sup>(1)</sup>	1E472706992		NPS 4 / DN 100	24A5709X022
	Fluorocarbon (FKM)	1N430406382		NPS 6, 8 x 6 or 12 x 6 /	
	Ethylene propylene (EPR)	1D6875X0092		DN 150, 200 x 150 or 300 x 150	24A8174X022
8 <sup>(1)</sup>	Travel Indicator Hex Nut, plated steel	1A662228992		Quick Opening, cast iron, ENC	
9 <sup>(1)</sup>	Spring, steel ( <b>standard</b> ) or Inconel® X-750 (NACE) See following table			NPS 1 / DN 25	37A7211X012
10 <sup>(1)</sup>	Travel Indicator Stem			NPS 2 / DN 50	37A7212X012
	18-8 Stainless steel			NPS 3 / DN 80	37A7213X012
	NPS 1 / DN 25	T14311T0012		NPS 4 / DN 100	37A7214X012
	NPS 2 / DN 50	T14275T0012		NPS 6, 8 x 6 or 12 x 6 /	
	NPS 3 / DN 80	T14312T0012		DN 150, 200 x 150 or 300 x 150	37A7215X022
	NPS 4 / DN 100	T14313T0012			
	NPS 6, 8 x 6 or 12 x 6 /				
	DN 150, 200 x 150 or 300 x 150	T14314T0012			

Key 9, Spring

BODY SIZE		SPRING						
		Standard (Steel)				NACE (Inconel® X-750)		
NPS	DN	20 psi / 1.4 bar, Yellow	60 psi / 4.1 bar, Green	125 psi / 8.6 bar, Blue	400 psi / 27.6 bar, Red	60 psi / 4.1 bar, Green	125 psi / 8.6 bar, Blue	400 psi / 27.6 bar, Red
1	25	----	14A9687X012	14A9680X012	14A9679X012	11B6769X012	12B8326X012	10B1882X012
2	50	14A6768X012	14A6626X012	14A6627X012	14A6628X012	16A5501X012	16A5995X012	16A5499X012
3	80	14A6771X012	14A6629X012	14A6630X012	14A6631X012	16A5503X012	16A5996X012	16A5500X012
4	100	14A6770X012	14A6632X012	14A6633X012	14A6634X012	16A5506X012	16A5997X012	16A5998X012
6, 8 x 6 or 12 x 6	150, 200 x 150 or 300 x 150	15A2253X012	14A9686X012	14A9685X012	15A2615X012	16A5510X012	16A5999X012	16A6000X012

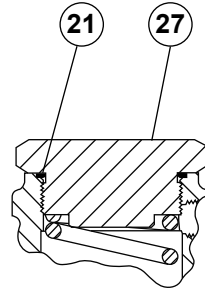
\*Recommended spare part.

1. Part included in trim package assembly can be ordered according to the parts kit trim package.

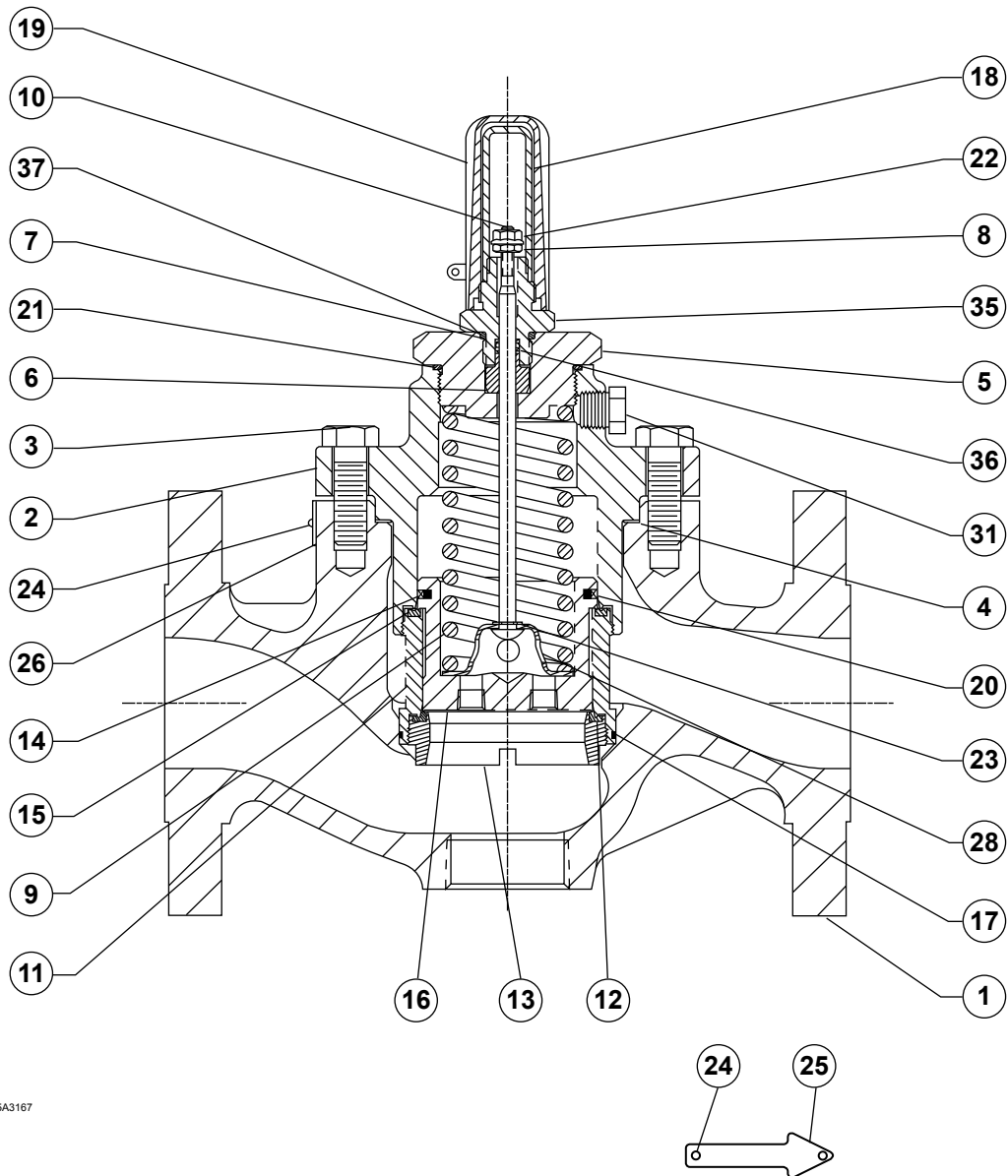
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# Types 1098-EGR and 1098H-EGR



INDICATOR PLUG ASSEMBLY



35A3167

COMPLETE CAST IRON  
FULL-CAPACITY MAIN VALVE ASSEMBLY

*Figure 12. Type EGR Main Valve Construction*

# Types 1098-EGR and 1098H-EGR

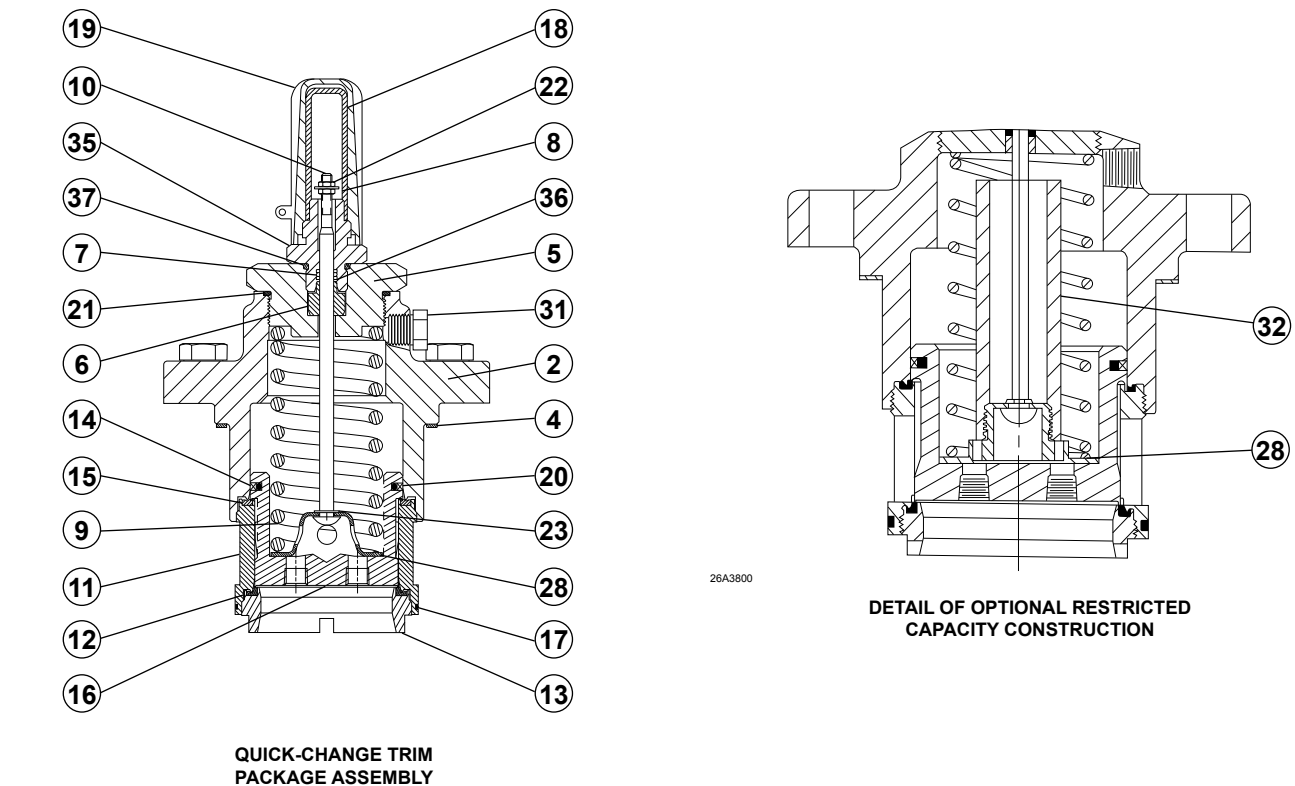


Figure 13. Type EGR Main Valve Internal Constructions

## Type EGR Main Valve (Figures 12 and 13) (continued)

Key	Description	Part Number	Key	Description	Part Number
12*	Port Seal		13*(1)	Seat Ring	
	Nitrile (NBR) <sup>(1)</sup> (standard)			416 Stainless steel	
	NPS 1 / DN 25	14A6788X012		NPS 1 / DN 25, 1-5/16 in. / 33 mm port	24A6781X012
	NPS 2 / DN 50	24A5673X012		NPS 2 / DN 50, 2-3/8 in. / 60 mm port	24A5670X012
	NPS 3 / DN 80	24A5658X012		NPS 3 / DN 80, 3-3/8 in. / 86 mm port	24A5655X012
	NPS 4 / DN 100	24A5643X012		NPS 4 / DN 100, 4-3/8 in. / 111 mm port	24A5640X012
	NPS 6, 8 x 6 or 12 x 6 /			NPS 6 / DN 150, 7-3/16 in. / 183 mm port	24A6989X012
	DN 150, 200 x 150 or 300 x 150	14A8175X012		NPS 8 x 6 / DN 200 x 150, 7-3/16 in. /	
	Fluorocarbon (FKM)			183 mm port	38A4216X012
	NPS 1 / DN 25	14A8186X012		316 Stainless steel (NACE)	
	NPS 2 / DN 50	25A7412X012		NPS 1 / DN 25, 1-5/16 in. / 33 mm port	24A6781X022
	NPS 3 / DN 80	25A7375X012		NPS 2 / DN 50, 2-3/8 in. / 60 mm port	24A5670X022
	NPS 4 / DN 100	25A7469X012		NPS 3 / DN 80, 3-3/8 in. / 86 mm port	24A5655X022
	NPS 6, 8 x 6 or 12 x 6 /			NPS 4 / DN 100, 4-3/8 in. / 111 mm port	24A5640X022
	DN 150, 200 x 150 or 300 x 150	14A6996X012		NPS 6 / DN 150, 7-3/16 in. / 183 mm port	24A6989X022
	Ethylene propylene (EPR)			NPS 8 x 6 / DN 200 x 150, 7-3/16 in. /	
	NPS 1 / DN 25	14A6788X022		183 mm port	38A4216X022
	NPS 2 / DN 50	24A5673X062	14*(1)	Piston Ring	
	NPS 3 / DN 80	24A5658X062		NPS 1 / DN 25, PTFE (clear)	14A6786X012
	NPS 4 / DN 100	24A5643X052		NPS 2 / DN 50, PTFE (clear)	14A5675X012
	NPS 6, 8 x 6 or 12 x 6 /			NPS 3 / DN 80, PTFE (clear)	14A5660X012
	DN 150, 200 x 150 or 300 x 150	14A8175X022		NPS 4 / DN 100, PTFE (clear)	14A5645X012
				NPS 6, 8 x 6 or 12 x 6 / DN 150, 200 x 150	
				or 300 x 150, glass-filled, PTFE	14A6985X022

\*Recommended spare part.

1. Part included in trim package assembly can be ordered according to the parts kit trim package.

# Types 1098-EGR and 1098H-EGR

## Type EGR Main Valve (Figures 12 and 13) (continued)

Key	Description	Part Number	Key	Description	Part Number
15*	Upper Seal		18	Travel Indicator Scale, plastic	
	Nitrile (NBR) <sup>(1)</sup> (standard)			NPS 1 <sup>(1)</sup> / DN 25	14A6759X012
	NPS 1 / DN 25	14A6789X012		NPS 2 <sup>(1)</sup> / DN 50	14A5678X012
	NPS 2 / DN 50	24A5674X012		NPS 3 <sup>(1)</sup> / DN 80	14A5662X012
	NPS 3 / DN 80	24A5659X012		NPS 4 / DN 100	
	NPS 4 / DN 100	24A5644X012		with 2 in. / 51 mm travel <sup>(1)</sup>	14A5647X012
	NPS 6, 8 x 6 or 12 x 6 /			with 1-1/2 in. / 38 mm travel	14A5662X012
	DN 150, 200 x 150 or 300 x 150	14A8176X012		NPS 6, 8 x 6 or 12 x 6 <sup>(1)</sup> /	
	Fluorocarbon (FKM)			DN 150, 200 x 150 or 300 x 150	14A5647X012
	NPS 1 / DN 25	14A8187X012	19	Travel Indicator Protector	
	NPS 2 / DN 50	25A7413X012		NPS 1 or 2 <sup>(1)</sup> / DN 25 or 50, plastic	24B1301X012
	NPS 3 / DN 80	25A7376X012		NPS 3, 4, 6 or 8 x 6 <sup>(1)</sup> /	
	NPS 4 / DN 100	25A7468X012		DN 80, 100, 150 or 200 x 150, plated steel	14A6769X012
	NPS 6, 8 x 6 or 12 x 6 /		20*	Plug O-ring	
	DN 150, 200 x 150 or 300 x 150	14A8185X012		Nitrile (NBR) <sup>(1)</sup> (standard)	
	Ethylene propylene (EPR)			NPS 1 / DN 25	14A6981X012
	NPS 1 / DN 25	14A6789X022		NPS 2 / DN 50	14A5686X012
	NPS 2 / DN 50	24A5674X062		NPS 3 / DN 80	1V326906562
	NPS 3 / DN 80	24A5659X062		NPS 4 / DN 100	14A5688X012
	NPS 4 / DN 100	24A5644X052		NPS 6, 8 x 6 or 12 x 6 /	
	NPS 6, 8 x 6 or 12 x 6 /			DN 150, 200 x 150 or 300 x 150	1K879306992
	DN 150, 200 x 150 or 300 x 150	14A8176X022		Fluorocarbon (FKM)	
16* <sup>(1)</sup>	Valve Plug			NPS 1 / DN 25	14A8188X012
	416 Stainless steel			NPS 2 / DN 50	14A5686X022
	NPS 1 / DN 25	14A6780X012		NPS 3 / DN 80	1V3269X0042
	NPS 2 / DN 50	24A6772X012		NPS 4 / DN 100	14A5688X022
	NPS 3 / DN 80	24A9421X012		NPS 6, 8 x 6 or 12 x 6 /	
	NPS 4 / DN 100	24A8182X012		DN 150, 200 x 150 or 300 x 150	1V547606382
	NPS 6, 8 x 6 or 12 x 6 /			Ethylene propylene (EPR)	
	DN 150, 200 x 150 or 300 x 150	24A6992X012		NPS 1 / DN 25	14A6981X032
	316 Stainless steel (NACE)			NPS 2 / DN 50	14A5686X052
	NPS 1 / DN 25	14A6780X022		NPS 3 / DN 80	1V3269X0062
	NPS 2 / DN 50	24A6772X032		NPS 4 / DN 100	14A5688X082
	NPS 3 / DN 80	24A9421X022		NPS 6, 8 x 6 and 12 x 6 /	
	NPS 4 / DN 100	24A8182X022		DN 150, 200 x 150 and 300 x 150	1K8793X0012
	NPS 6, 8 x 6 or 12 x 6 /		21*	Travel Indicator Fitting or Indicator Plug O-ring	
	DN 150, 200 x 150 or 300 x 150	24A6992X022		Nitrile (NBR) <sup>(1)</sup>	
17*	Cage O-ring			NPS 1 / DN 25	10A8931X012
	Nitrile (NBR) <sup>(1)</sup> (standard)			NPS 2, 3 or 4 / DN 50, 80 or 100	10A3800X012
	NPS 1 / DN 25	10A7777X012		NPS 6, 8 x 6 or 12 x 6 /	
	NPS 2 / DN 50	10A7779X012		DN 150, 200 x 150 or 300 x 150	1F262906992
	NPS 3 / DN 80	14A5688X012		Fluorocarbon (FKM)	
	NPS 4 / DN 100	10A3481X012		NPS 1 / DN 25	10A0811X012
	NPS 6, 8 x 6 or 12 x 6 /			NPS 2, 3 or 4 / DN 50, 80 or 100	1R727606382
	DN 150, 200 x 150 or 300 x 150	18A2556X022		NPS 6, 8 x 6 or 12 x 6 /	
	Fluorocarbon (FKM)			DN 150, 200 x 150 or 300 x 150	1F2629X0012
	NPS 1 / DN 25	10A7778X012		Ethylene propylene (EPR)	
	NPS 2 / DN 50	10A7779X022		NPS 1 / DN 25	10A8931X022
	NPS 3 / DN 80	14A5688X022		NPS 2, 3 or 4 / DN 50, 80 or 100	10A3800X042
	NPS 4 / DN 100	10A3483X012		NPS 6, 8 x 6 or 12 x 6 /	
	NPS 6, 8 x 6 or 12 x 6 /			DN 150, 200 x 150 or 300 x 150	1F2629X0032
	DN 150, 200 x 150 or 300 x 150	18A2556X032	22 <sup>(1)</sup>	Travel Indicator Flange Nut, plated steel	14A5693X012
	Ethylene propylene (EPR)		23 <sup>(1)</sup>	E-Ring	
	NPS 1 / DN 25	10A7777X022		Stainless steel	14A8181X012
	NPS 2 / DN 50	10A7779X052		1577 steel, heat-treated (NACE)	14A8181X022
	NPS 3 / DN 80	14A5688X082	24	Drive Screw, 18-8 Stainless steel (2 required)	1A368228982
	NPS 4 / DN 100	10A3481X052	25	Flow Arrow, 18-8 Stainless steel	1V105938982
	NPS 6, 8 x 6 or 12 x 6 /		26	Body Rating Plate, Stainless steel (not shown)	-----
	DN 150, 200 x 150 or 300 x 150	18A2556X072			

\*Recommended spare part.

1. Part included in trim package assembly can be ordered according to the parts kit trim package.

# Types 1098-EGR and 1098H-EGR

## Type EGR Main Valve (Figures 12 and 13) (continued)

Key	Description	Part Number
27	Indicator Plug	
	Zinc-plated steel	
	NPS 1 / DN 25	14A6983X012
	NPS 2 / DN 50	14A9684X012
	NPS 3 / DN 80	14A9684X012
	NPS 4 / DN 100	14A9684X012
	316 Stainless steel (NACE)	
	NPS 1 / DN 25	14A6983X022
	NPS 2 / DN 50	14A9684X032
	NPS 3 / DN 80	14A9684X032
	NPS 4 / DN 100	14A9684X032
	NPS 6, 8 x 6 or 12 x 6 /	
	DN 150, 200 x 150 or 300 x 150	14A8178X032
28	Spring Seat	
	Full capacity trim <sup>(1)</sup>	
	Plated steel	
	NPS 1 / DN 25	14A6982X012
	NPS 2, 3 or 4 / DN 50, 80 or 100	15A2206X012
	NPS 6 or 8 x 6 / DN 150 or 200 x 150	14A8177X012
	Heat-treated wrought steel (NACE)	
	NPS 1 / DN 25	14A6982X022
	NPS 2, 3 or 4 / DN 50, 80 or 100	15A2206X022
	NPS 6, 8 x 6 or 12 x 6 /	
	DN 150, 200 x 150 or 300 x 150	14A8177X022
	Restricted capacity trim	
	416 Stainless steel, heat-treated,	
	NPS 2, 3 or 4 / DN 50, 80 or 100	14A9678X012
	NPS 6 / DN 150	14A9688X012
29	Hex Nut Steel (use with Stainless steel body) (not shown)	
	NPS 1 / DN 25 (4 required)	1C330635252
	NPS 2 / DN 50 (8 required)	1A377235252
	NPS 3 / DN 80 (8 required)	1A376035252
	NPS 4 / DN 100 (8 required)	1A352035252
	NPS 6, 8 x 6 or 12 x 6 /	
	DN 150, 200 x 150 or 300 x 150	
	(12 required)	1A440935252
31 <sup>(1)</sup>	Pipe Plug	
	Plated steel, for all sizes	1A767524662
	316 Stainless steel (NACE),	
	For NPS 2, 3 or 4 / DN 50, 80 or 100	1A767535072
	For NPS 6, 8 x 6 or 12 x 6 /	
	DN 150, 200 x 150 or 300 x 150	1A767535072
32	Travel Stop, galvanized plated steel (not used with full capacity trim)	
	NPS 2 / DN 50	
	30% capacity	14A9677X012
	70% capacity	14A9676X012
	NPS 3 / DN 80, 40% capacity	14A9671X012
	NPS 4 / DN 100, 40% capacity	14A9670X012
	NPS 6 / DN 150, 40% capacity	14A9682X012
33	NACE Tag (not shown) (NACE)	19A6034X012
34	Tag Wire (not shown) (NACE)	1U7581X0022
35	Fitting	
	All sizes	T21104T0012
	All sizes (NACE)	T21104T0022
36 <sup>*(1)</sup>	Backup Ring (2 Required)	
	All sizes	1K786806992
37*	O-ring	
	Nitrile (NBR) <sup>(1)</sup>	18B3438X012
	Fluorocarbon (FKM)	1N430306382
	Ethylene propylene (EPR)	1N4303X0012

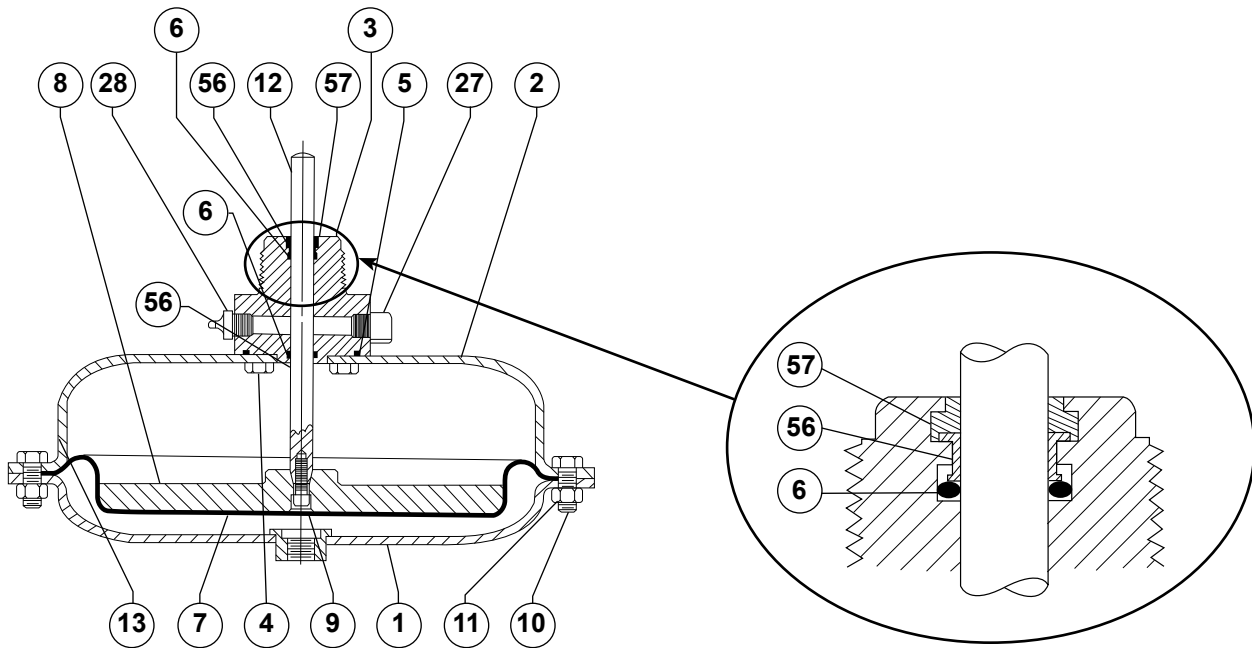
## Types 1098 and 1098H Actuators (Figure 14)

Key	Description	Part Number
1	Lower Casing	
	Size 30	
	Type 1098	
	Steel	2E8007X00B2
	Steel (NACE)	2E8007X0042
	Type 1098H	
	WCC Steel	36A8537X012
	CF8M Stainless steel (NACE)	36A8537X032
	Size 40	
	Type 1098	
	Steel	24A7155X012
	Steel (NACE)	24A7155X072
	304 Stainless steel (NACE)	24A7155X052
	Size 70	
	Type 1098	
	Steel	2N1266X00B2
	Steel (NACE)	2N1266X0072
	Stainless steel (NACE)	2N1266X0082
2	Upper Casing	
	Size 30	
	Type 1098	
	Steel	25A7340X012
	Steel (NACE)	25A7340X032
	Type 1098H	
	WCC Steel	36A8535X012
	Stainless steel (NACE)	36A8535X052
	Size 40	
	Type 1098	
	Steel	24A5680X012
	Steel (NACE)	24A5680X062
	Stainless steel (NACE)	24A5680X042
	Size 70	
	Type 1098	
	Steel	25A2607X012
	Steel (NACE)	25A2607X032
	Stainless steel (NACE)	25A2607X042
3	Bonnet	
	Zinc-plated steel	33B0301X012
	304 Stainless steel (NACE)	33B0301X052
4	Cap Screw	
	Sizes 30 and 40 (4 required)	
	Plated Steel	1D529824052
	Stainless steel (NACE)	1D529838992
	Size 70 (4 required)	
	Plated Steel	1A368424052
	Stainless steel (NACE)	1A368435072
5	Casing O-ring	
	Nitrile (NBR)	1F358106992
	Fluorocarbon (FKM)	1F3581X0022
	Ethylene propylene (EPDM)	1F3581X0052
6	Stem O-ring (2 required)	
	Nitrile (NBR)	1C782206992
	Fluorocarbon (FKM)	1K756106382
	Ethylene propylene (EPDM)	1C7822X0052
7	Diaphragm	
	Type 1098	
	Nitrile (NBR)	
	Size 30	2E791902202
	Size 40	27B9744X012
	Size 70	2N126902202
	Fluorocarbon (FKM)	
	Size 30	2E7919X0052
	Size 40	27B9744X022
	Size 70	2N1269X0032

\*Recommended spare part.

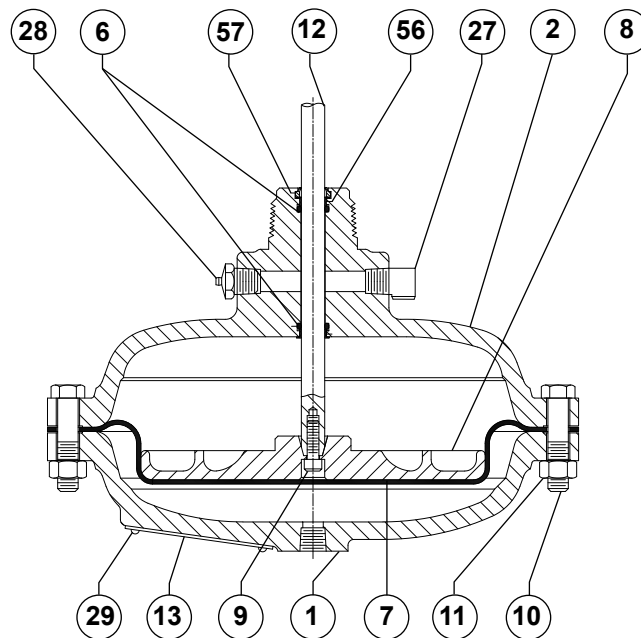
1. Part included in trim package assembly can be ordered according to the parts kit trim package.

# Types 1098-EGR and 1098H-EGR



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TYPE 1098



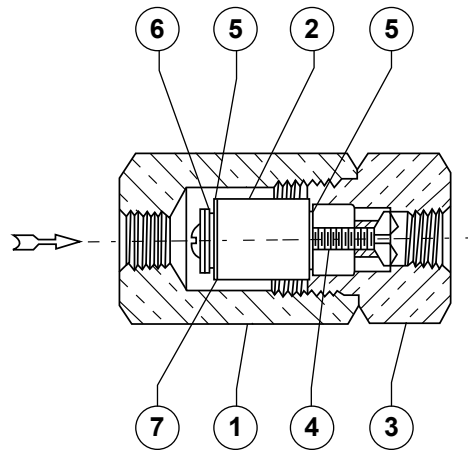
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TYPE 1098H

Figure 14. Types 1098 and 1098H Actuator Assemblies

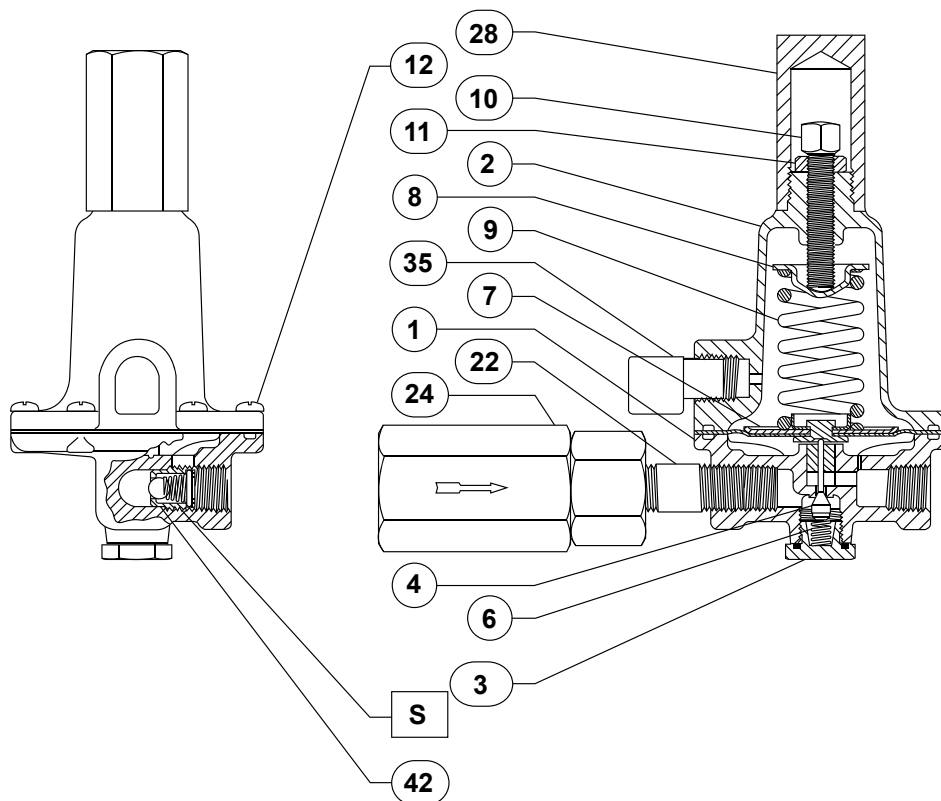


# Types 1098-EGR and 1098H-EGR



AJ5004

**Figure 15. Standard P590 Series Filter Assembly**



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□ APPLY SEALANT (S)  
S = MULTI-PURPOSE PTFE THREAD SEALANT

**Figure 16. Type 6351 Pilot Assembly**

# Types 1098-EGR and 1098H-EGR

## Type 6351 Pilot (Figure 16) (continued)

Key	Description	Part Number	Key	Description	Part Number
7*	Diaphragm Assembly (includes plated steel diaphragm plate) Nitrile (NBR) diaphragm and Aluminum pusher post	1B7980000B2	3	Body Plug Aluminum 316 Stainless steel	15A6221X012 15A6221X042
	Nitrile (NBR) diaphragm and Stainless steel pusher post	1B7980X00A2	4	Valve Plug and Stem Assembly Nitrile (NBR) disk with Stainless steel stem ( <b>standard</b> )	15A6207X012
	Fluorocarbon (FKM) diaphragm and Aluminum pusher post	1B7980000C2		Nitrile (NBR) disk with 316 Stainless steel stem (NACE)	15A6207X052
8	Upper Spring Seat	1B798525062		Fluorocarbon (FKM) with Stainless steel stem (for use in Oxygen service)	15A6207X042
9	Control Spring, plated steel 3 to 20 psig / 0.21 to 1.4 bar range, Green 5 to 35 psig / 0.35 to 2.4 bar range, Unpainted 35 to 100 psig / 2.4 to 6.9 bar range, Red	1B986027212 1B788327022 1K748527202		Fluorocarbon (FKM) disk with 316 Stainless steel stem (NACE)	15A6207X112
10	Adjusting Screw		5	Diaphragm Assembly Type 6352, Nitrile (NBR)	15A6216X012
	Aluminum bonnet	10B7192X012		Type 6353, Nitrile (NBR)	15A6216X022
11	Locknut, plated steel			Type 6353, Fluorocarbon (FKM)	15A6216X092
	Aluminum bonnet	1A946324122		Type 6353, Fluorocarbon (FKM) (for use in Oxygen service)	15A6216X162
12	Machine Screw, Steel (6 required)	T13305T0012		Type 6354, Neoprene (CR)	15A6216X032
13	Hex Lock Plate, Aluminum (not shown)	10B2695X012		Type 6354, Fluorocarbon (FKM)	15A6216X152
14	Threaded Lock Plate, Sluminum (not shown)	10B2696X012		Type 6352, Nitrile (NBR) (NACE)	15A6216X552
22	Pipe Nipple, Standard and Corrosive service, Galvanized plated steel (use with P590 Series) Steel (NACE)	1C488226232 1C4882X0032		Type 6353, Nitrile (NBR) (NACE)	15A6216X542
24	P590 Series Filter (parts listed under separate heading) Type P594-1, Brass ( <b>standard</b> ) Type P593-1, Aluminum	AJ5004000A2 AJ5004T0012		Type 6354, Fluorocarbon (FKM) (NACE)	15A6216X562
28	Closing Cap, Plastic			Type 6354, Fluorocarbon (FKM) (for use of Oxygen service)	15A6216X502
	Aluminum bonnet	23B9152X012		Type 6354, Neoprene (CR) (NACE)	15A6216X572
35	Vent Assembly (Type Y602-12)	Y602-12	6	Control Spring Type 6352 14 in. w.c. to 2 psig / 35 mbar to 0.14 bar 2 to 10 psig / 0.14 to 0.69 bar, Black	14A9672X012 14A9673X012
42	Relief Valve Assembly Aluminum / 302 Stainless steel (NACE) All other assemblies	16A5929X042 16A5929X022		Type 6353 3 to 40 psig / 0.21 to 2.8 bar 35 to 125 psig / 2.4 to 8.6 bar	1E392527022 1K748527202

## Types 6352, 6353, 6354L, 6354M and 6354H Pilots (Figure 17)

Key	Description	Part Number	Key	Description	Part Number
	Parts kit (included are: valve plug, key 4; diaphragm assembly, key 5; body plug gasket, key 12; bellows O-ring, key 17; closing cap gasket, key 20; and for the P590 Series filter, filter element, key 2; and gasket, key 7)		7	Spring Seat, Plated steel Type 6352 or 6353 Type 6354L, 6354M or 6354H	1B798525062 1K155828982
	Type 6352	R6352X00012	8	Stem Guide 416 Stainless steel ( <b>standard</b> ) 410 Stainless steel (NACE)	15A6222X012 15A6222X022
	Type 6353	R6353X00012	9	Adjusting Screw Type 6352 Type 6353 Type 6354 For use with Type 662	10B3692X012 10B7192X012 10B6190X012 18B3500X052
	Type 6354	R6354X00012	10	Locknut Type 6352 Type 6353 or 6354	1C724018992 1A946324122
1	Pilot Body Aluminum with 25 psig / 1.7 bar relief Aluminum with 50 psig / 3.4 bar Type 1806H relief Stainless steel with 25 psig / 1.7 bar relief Stainless steel with 50 psig / 3.4 bar Type 1806H relief	35A6228X012 17A8075X012 39A5971X012 17A8075X022	11	Closing Cap Aluminum Stainless steel	23B9152X012 1H2369X0032
2	Spring Case Aluminum Stainless steel	25A6220X012 28A9277X012	12	Body Plug Gasket / O-ring For Aluminum body, composition For Stainless steel body, Nitrile (NBR) For Stainless steel body, Fluorocarbon (FKM)	1C495704022 1F113906992 1N463906382
2	Regulator Bonnet (for Type 6353)	24B6641X022	13	Vent Assembly	Type Y602-12

\*Recommended spare part.



# Types 1098-EGR and 1098H-EGR

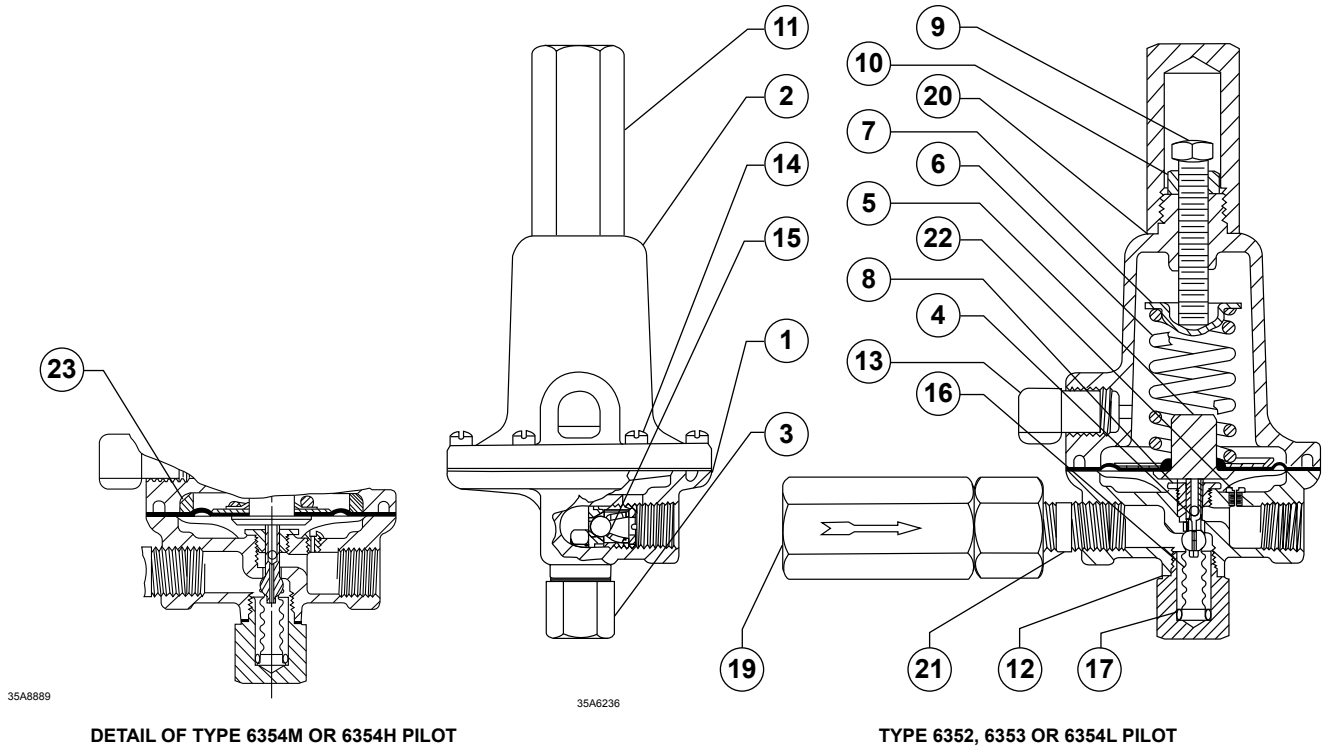


Figure 17. Types 6352 through 6354H Pilot Assemblies

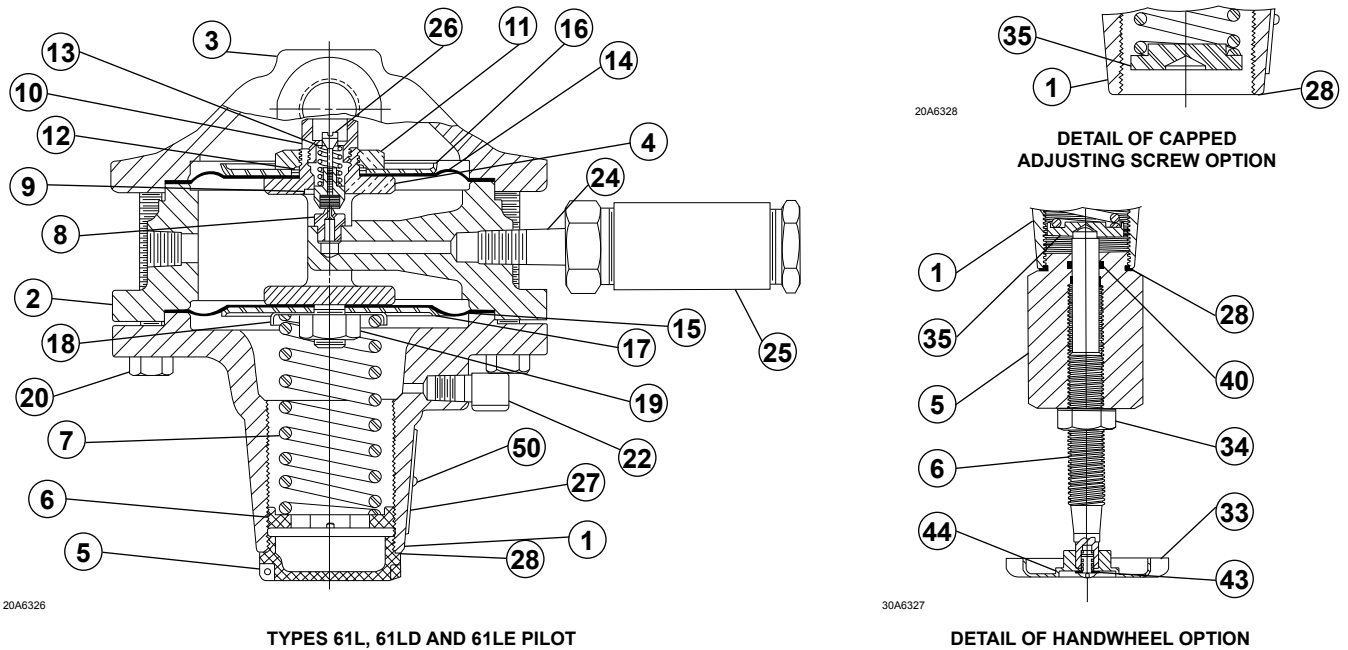


Figure 18. Types 61L, 61LD and 61LE Pilot Assemblies

# Types 1098-EGR and 1098H-EGR

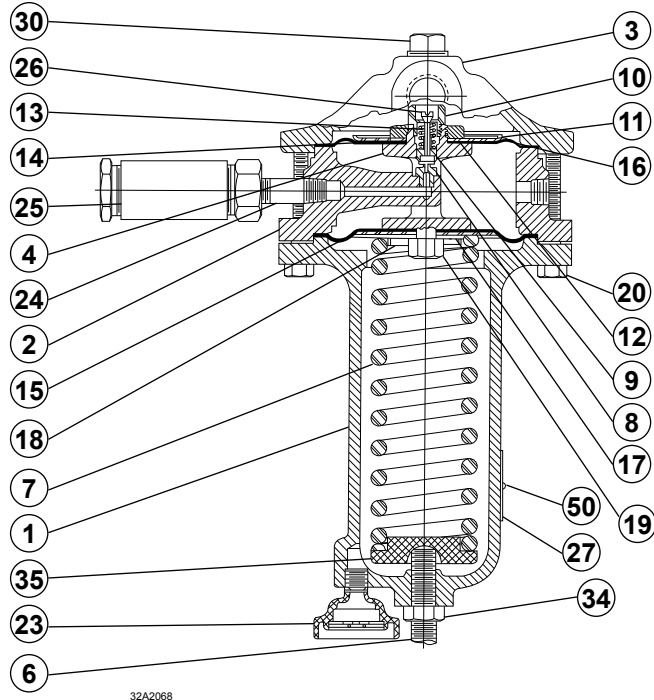
## Types 6352, 6353, 6354L, 6354M and 6354H Pilots (Figure 17) (continued)

Key	Description	Part Number	Key	Description	Part Number
14	Machine Screw (6 required) Aluminum	10B6189X022	2	Relay Valve Body, Cast Iron Types 61L, 61LD, 61LE and 61H	2J581919012
	Stainless steel	1V4360X0022		Type 61HP	33A9845X012
15	Relief Valve Assembly 25 psig / 1.7 bar	16A5929X052	3	Bottom Cover Types 61L, 61LD, 61LE and 61H, Cast Iron	2C518619012
	25 psig / 1.7 bar (NACE)	16A5929X042		Type 61HP, Steel	13A9843X012
	25 psig / 1.7 bar (for Oxygen service)	16A5929X032	4	Relay Yoke Types 61L, 61LD, 61LE and 61H, Zinc Die Casting	1D662544012
	25 psig / 1.7 bar (Stainless steel)	16A5929X072		Type 61HP (2 required), 410/416 Stainless steel	13A9838X012
16	Bellows Assembly, Stainless steel Standard for all except in Oxygen service For use in Oxygen service	15A6202X032 15A6202X022	5	Closing Cap Assembly Types 61L, 61LD and 61LE For all except pilots with handwheel adjusting screw and pressure loaded pilots, Plastic	T11069X0012
17	O-ring Nitrile (NBR), Standard and NACE Service Fluorocarbon (FKM), Standard and NACE Service (also for Oxygen service)	1D682506992 1D6825X0012		Pressure loaded trim for corrosive service, Steel	1E422724092
19	Filter P590 Series (standard), (Type P594-1) P590 Series for corrosive service, (Type P593-1) P590 Series for NACE service, (Type P593-1)	P590X1-A2 P590X1-A1 P590X1-A6		Standard trim with handwheel adjusting screw, Brass	1R759314012
20	Closing Cap Gasket, Composition	15A6218X012		Type 61H Capped adjusting screw, Brass	1H236514012
21	Pipe Nipple For standard and corrosive service, Galvanized steel	1C488226232	6	Adjusting Screw Types 61L, 61LD and 61LE For all except handwheel adjusting screw, Zinc Die Casting	1B537944012
	For NACE service, Steel	1C4882X0032		For use with handwheel adjusting screw, Brass	1R759414012
	For corrosive NACE service, Stainless steel	1C488238982		Type 61H, Steel Standard	
22	Restriction, Plated Carbon Steel Standard	17A2030X012		For 10 to 35 psig / 0.69 to 2.4 bar range	1A500528982
	High	17A2029X012		For 10 to 50 psig / 0.69 to 3.5 bar range	1B212028982
23	Diaphragm Limiter Aluminum	15A9259X012		For 10 to 65 psig / 0.69 to 4.5 bar range	1A279128982
	Stainless steel	10B4407X012		Pressure loaded/capped adjusting screw	1J881524102
26	NACE Tag, 18-8 Stainless steel	19A6034X012		Type 662 mounting	18B3500X072
27	Tag Wire, 304 Stainless steel	1U7581X0022		Type 61HP, Steel	
28	Packing Bonnet, 316 Stainless steel	1L449635072		Standard	1C216032992
29	Packing Nut, Plated Steel	0P077624102	7	Control Spring, Steel Type 61LD	
30	Handwheel	1L217544992		0 to 4 in. w.c. / 0 to 10 mbar, Orange	1B558527052
31	Washer, Plated Carbon steel	1A329128982		3 to 12 in. w.c. / 7 to 30 mbar, Unpainted	1C680627222
32	Screw, Plated Carbon steel	1E985428982		Types 61L, 61LD and 61LE	
33	Packing Spring, 316 Stainless steel	1F125437012		0.25 to 2 psig / 17 mbar to 0.14 bar, Red	1B886327022
34	Packing Box Gasket, Plated steel	1B487099202		1 to 5 psig / 69 mbar to 0.35 bar, Yellow	1J857827022
35	Packing Follower, 316 Stainless steel	1K885035072		2 to 10 psig / 0.14 to 0.69 bar, Blue	1B886427022
36	External Adaptor, PTFE	1F124801012		5 to 15 psig / 0.34 to 1.0 bar, Brown	1J857927142
37	Internal Adaptor, PTFE	1F124401012		10 to 20 psig / 0.69 to 1.4 bar, Green	1B886527022
38	Packing Washer, 316 Stainless steel	1F125236042		Type 61H 10 to 65 psig / 0.69 to 4.5 bar, Green Stripe	0Y066427022
39	Packing Ring (3 required), PTFE	1C752601012		Type 61HP	
40	Adjusting Screw, 410/416 Stainless steel	21B5621X012		15 to 45 psig / 1.0 to 3.1 bar, Yellow	1E392527022
				35 to 100 psig / 2.4 to 6.9 bar, Blue	1D387227022
				100 to 300 psig / 6.9 to 20.7 bar, Red	1D465127142

## 61 Series Pilots (Figures 18, 19 and 20)

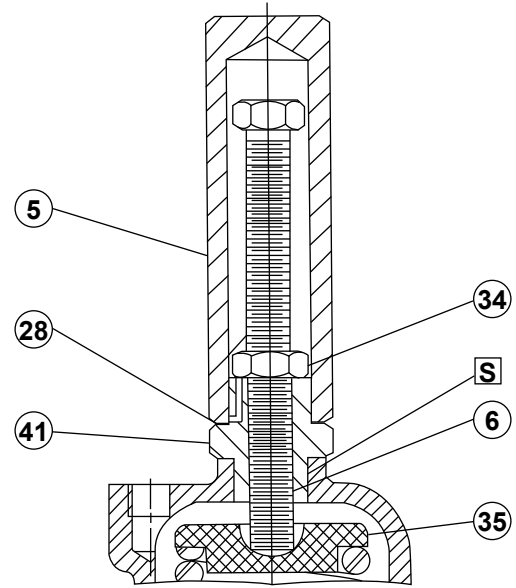
Key	Description	Part Number	Key	Description	Part Number
	Repair Parts Kits, Nitrile (NBR) (Includes keys 8, 9, 10, 12, 13, 14, 15, 26 and 28) Types 61L and 61LE	R61LX000012	8	Relay Orifice (for 61 Series except Type 61HP), 303 Stainless steel	
	Types 61LD	R61LDX00012		Standard applications	1C520135032
	Repair Parts Kits, Nitrile (NBR) (Includes keys 8, 9, 10, 12, 13, 14, 15 and 26) Type 61H	R61HX000012		Fast close and open, open only or close only (For Types 61L and 61LD only)	1D373735032
1	Relay Spring Case, Cast Iron Types 61L, 61LD and 61LE	1B983919012		Special orifice, fast open only application (For Types 61L and 61LD only)	1E874235132
	Type 61H		9	Disk Holder Assembly (for 61 Series except Type 61HP)	
	Standard adjusting screw	1B984119012		Standard trim, Brass / Nitrile (NBR)	1B8868000A2
	Capped adjusting screw or for Type 662	1H232619012		Trim for corrosive service, 303 Stainless steel	1B8868000B2
	Type 61HP			Oxygen service and pressure loaded trim for corrosive service, Brass / Fluorocarbon (FKM)	1N3638000A2
	Standard adjusting screw	2P969419012			

# Types 1098-EGR and 1098H-EGR



TYPE 61H PILOT

□ APPLY SEALANT (S)  
S = MULTI-PURPOSE PTFE THREAD SEALANT



DETAIL OF CAPPED  
ADJUSTING SCREW OPTION

Figure 19. Type 61H Pilot Assembly

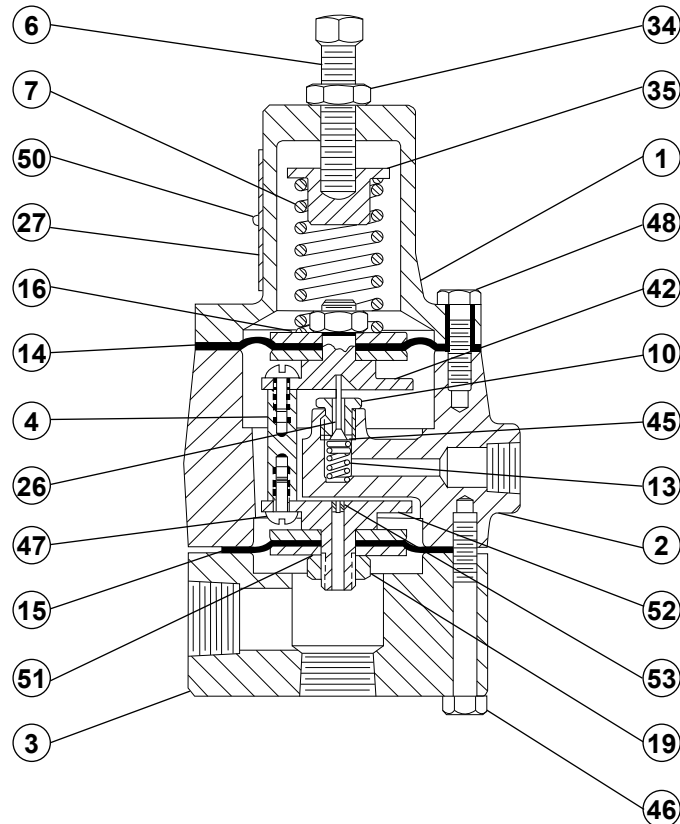


Figure 20. Type 61HP Pilot Assembly

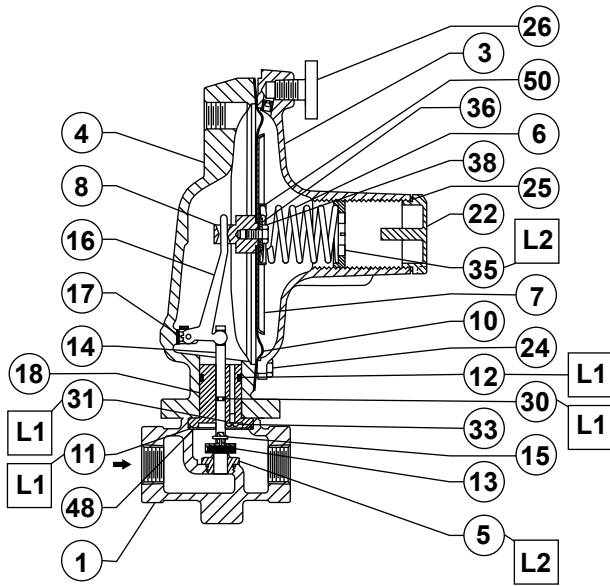
# Types 1098-EGR and 1098H-EGR

## 61 Series Pilots (Figures 18, 19 and 20) (continued)

Key	Description	Part Number	Key	Description	Part Number
10	Bleed Orifice, 303 Stainless steel Types 61L, 61LD, 61LE and 61H Standard bleed Special bleed Capped bleed (for Types 61L and 61LD only) Type 61HP	1B887335032 1C831435032 1D777135032 1D318135032	20	Cap Screw (8 required), Zinc-plated steel (For 61 Series except Type 61HP)	1B989624052
11	Diaphragm Nut, (for 61 Series except Type 61HP) Standard trim, Oxygen service and pressure loaded trim for corrosive service, 316 Stainless steel Trim for corrosive service, 18-8 Stainless steel	1B989514012 1B989535072	23	Pipe Plug or Vent Assembly Pipe Plug for Types 61L, 61LD and 61LE, Steel Vent Assembly for Type 61H	1A649528982 Type Y602-1 1C488226232
12*	O-ring Seal (for 61 Series except Type 61HP) Standard and trim for corrosive service, Nitrile (NBR) Oxygen service and pressure loaded trim for corrosive service, Fluorocarbon (FKM)	1B885506992 1B8855X0012	24	Pipe Nipple, Galvanized / Zinc-plated steel	
13	Relay Spring, 302 Stainless steel Types 61L and 61LE Type 61LD Type 61H Up to 300 psig / 20.7 bar inlet pressure 300 to 400 psig / 20.7 to 27.6 bar inlet pressure Type 61HP	1C911537022 1E643637022 1C911537022 1N859137022 1B797937022	25	Filter Assembly Standard trim Trim for corrosive service	Type P594-1 Type P593-1
14*	Upper Relay Diaphragm Types 61L, 61LD, 61LE and 61H Standard and trim for corrosive service, Nitrile (NBR) Oxygen service and pressure loaded trim for corrosive service, Fluorocarbon (FKM) Type 61HP Standard, Neoprene (CR) Oxygen service, Fluorocarbon (FKM)	1B885202052 1N162802332 13A9841X022 13A9841X012	26	Bleed Valve Types 61L, 61LE and 61H, 416 Stainless steel Type 61LD, 416 Stainless steel Type 61HP Standard Trim, Stainless steel / Nitrile (NBR) Oxygen Service, Stainless steel / Fluorocarbon (FKM)	1D986735132 1H951635132 1D5604000B2 1N3798000C2
15*	Lower Relay Diaphragm Types 61L, 61LD and 61LE Standard and trim for corrosive service, Nitrile (NBR) Oxygen service and pressure loaded trim for corrosive service, Fluorocarbon (FKM) Type 61H Standard and trim for corrosive service, Neoprene (CR) Oxygen service, Fluorocarbon (FKM) (2 required) Type 61HP Standard, Neoprene (CR) Oxygen service, Fluorocarbon (FKM)	1B886002052 1N536102332 1B894202192 1N162702302 13A9840X012 13A9840X022	27	Nameplate	-----
16	Upper Relay Head, Zinc-plated steel Types 61L and 61LD Type 61LE Type 61H	1B989325072 1D558425072 1D558425072	28*	Gasket Types 61L, 61LD and 61LE, Neoprene (CR) Type 61H, Steel Plated / Composition	1P753306992 1B487099202
16	Diaphragm Plate, 410/416 Stainless steel Type 61HP (4 required)	13A9839X012	30	Pipe Plug (for 61 Series except Type 61HP), Zinc-plated steel	1A369224492
17	Lower Relay Head, Zinc-plated steel Types 61L, 61LD and 61LE Type 61H	1B989425072 1D558325072	32	Bleed Orifice Cap (for Types 61L and 61LD with capped bleed only), 303 Stainless steel	1D777235032
18	Spring Seat, Zinc-plated steel Types 61L, 61LD and 61LE Type 61H	1B886225072 1D558525072	33	Handwheel (for Types 61L, 61LD and 61LE only), Zinc Die Cast	1J496144012
19	Hex Nut, Zinc-plated steel Types 61L, 61LD, 61LE and 61H Type 61HP (2 required)	1A340324122 1A346524122	34	Hex Nut Types 61L, 61LD and 61LE Type 61H Type 61HP	1A351124122 1A352424122 1A352224122
			35	Spring Seat, Zinc-plated steel Types 61L, 61LD and 61LE Type 61H Type 61HP	1J618124092 16A9812X012 10A3963X012
			40*	O-ring (for Types 61L, 61LD and 61LE only), Nitrile (NBR)	1D541506992
			41	Adaptor (for Type 61H only), Brass	1J881624092
			42	Yoke Cap (for Type 61HP only), 410/416 Stainless steel	13A9836X012
			43	Lockwasher (for Types 61L, 61LD and 61LE), Steel	1A352332992
			44	Machine Screw (for Types 61L, 61LD and 61LE only), Steel	16A5763X012
			45	Valve Spring Seat (for Type 61HP only), 316 Stainless steel	1L251135072
			46	Cap Screw (6 required) (for Type 61HP only)	15A0690X012
			47	Machine Screw (4 required) (for Type 61HP only), 303 Stainless steel	1A866935032
			48	Cap Screw (6 required) (for Type 61HP only)	1P327028982
			50	Drive Screw (2 required), 18-8 Stainless steel	1A368228982
			51*	Diaphragm Insert (2 required) (for Type 61HP only) Standard, Nitrile (NBR) Oxygen service, Fluorocarbon (FKM)	13A9842X012 13A9842X022
			52	Lower Yoke Cap (for Type 61HP only), 410/416 Stainless steel	13A9837X012
			53	Bleed Plug (for Type 61HP only), Brass	1V211514012
			54	Vent Assembly, Xenoy™ / 18-8 Stainless steel	Type Y602-12

\*Recommended spare part.

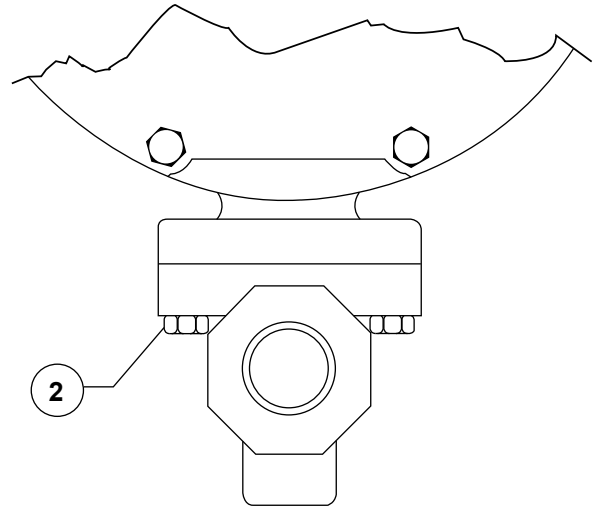
# Types 1098-EGR and 1098H-EGR



47B3687

□ APPLY LUBRICANT (L)  
L1 = SILICONE GREASE LUBRICANT  
L2 = ANTI-SEIZE AND LUBRICATING COMPOUND

Figure 21. Type Y600AM Regulator Assembly



47B3687

Figure 22. Diaphragm Casing Cap Screw Location

## Type Y600AM Parts List (Figures 21 through 22)

Key	Description	Part Number	Key	Description	Part Number
	Parts Kit (keys 10, 11, 12, 13, 15, 30, 31 and 33) Type Y600AM	RY600AX0012	14	Stem, 303 Stainless steel	17B3423X012
1	Body, Cast Iron 3/4 NPT	1E987119012	15*	Cotter Pin, 302 Stainless steel	1A866537022
2	Cap Screw (2 required), Zinc-plated steel	1C856228992	16	Lever Assembly, Steel / Stainless steel	1B5375X0082
3	Spring Case Assembly, Cast iron	1B6365X0342	17	Machine Screw (2 required), 18-8 Stainless steel	19A7151X022
4	Diaphragm Casing, Cast iron	47B2271X012	18	Guide Insert, Delrin®	27B4028X012
5	Orifice, Aluminum, 1/4 in. / 6.4 mm	0B042009012	22	Closing Cap	T11069X0012
6	Spring, Plated steel 4 to 8 in. w.c. / 10 to 20 mbar, Red 7 to 16 in. w.c. / 17 to 40 mbar, Unpainted 15 in. w.c. to 1.2 psig / 37 mbar to 0.08 bar, Yellow 1.2 to 2.5 psig / 0.08 to 0.17 bar, Green 2.5 to 4.5 psig / 0.17 to 0.31 bar, Light Blue 4.5 to 7 psig / 0.31 to 0.52 bar, Black	1B653827052 1B653927022 1B537027052 1B537127022 1B537227022 1B537327052	23	Hex Nut, not shown (8 required), Zinc-plated steel	1E985324142
7	Diaphragm Head, 304 Stainless steel	17B9723X032	24	Cap Screw (8 required), Zinc-plated steel	T1070824912
8	Pusher Post, Aluminum	17B9734X032	25*	Closing Cap Gasket, Neoprene (CR)	1P753306992
10*	Diaphragm, Nitrile (NBR)	17B9726X012	26	Type Y602 Vent Assembly Spring case up ( <b>standard</b> ) Spring case down	Type Y602-11 Type Y602-1
11*	Body Seal O-ring, Nitrile (NBR)	1H993806992	30*	Stem O-ring Nitrile (NBR)	1H292606992
12*	Insert Seal O-ring, Nitrile (NBR)	1B885506992	31*	Throat Seal O-ring Nitrile (NBR)	1D682506992
13*	Disk Assembly, Aluminum Disk Holder with Nitrile (NBR) disk	1C4248X0212	33	Machine Screw, 18-8 Stainless steel	18A0703X022
			35	Adjusting Screw, Zinc	1B537944012
			36	Washer, Plated Carbon Steel	18B3440X012
			38	Diaphragm Cap Screw, Zinc-plated steel	1B290524052
			48	Backup Ring, 302 Stainless steel	18B3446X012
			50	Lower Spring Seat, Zinc-plated steel	1B636325062

\*Recommended spare part.  
Delrin® is a mark owned by E.I. du Pont de Nemours and Co.

# Types 1098-EGR and 1098H-EGR

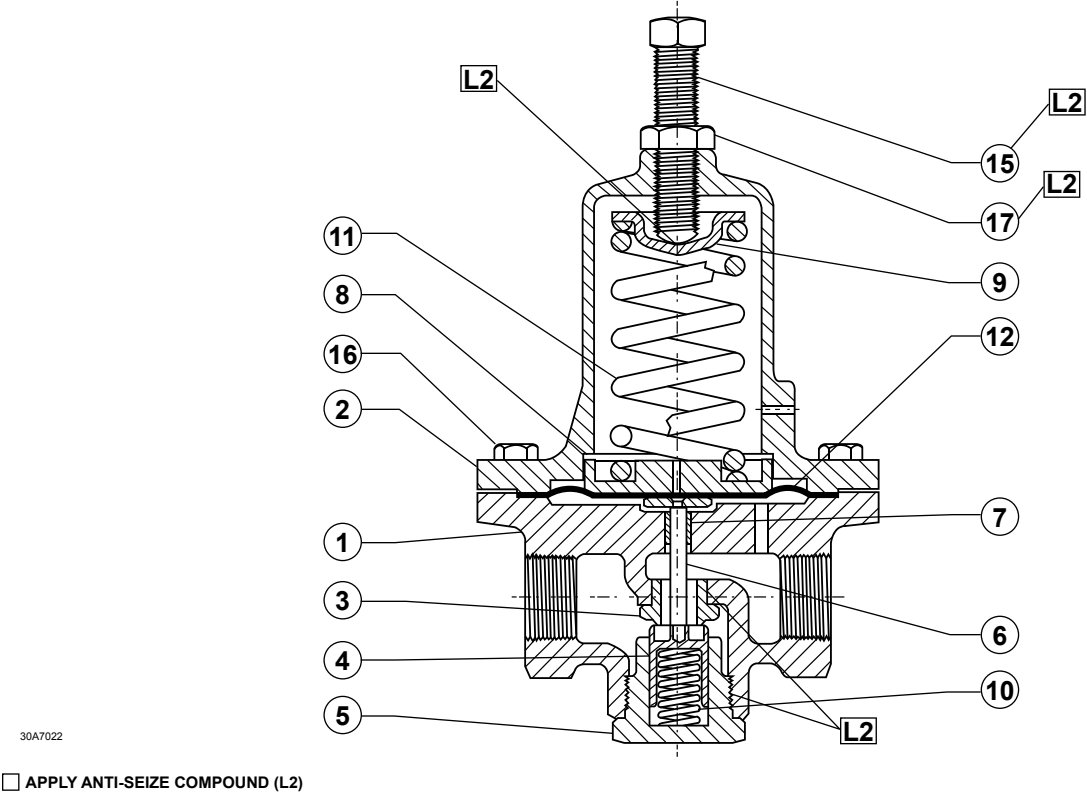


Figure 23. Type 95H Supply Pressure Regulator

## Type 95H Regulator (Figure 23)

Key	Description	Part Number	Key	Description	Part Number
	Parts Kit (Included are keys 3, 4, 10 and 12) for composition, Trim 3A, 1/4 NPT body	R95HX000102	8	Lower Spring Seat Aluminum <b>(standard)</b>	1E392309012
1	Body, 1/4 NPT Cast iron	1E391019012	9	Upper Spring Seat Zinc-plated steel	1B798525062
2	Spring Case Cast iron	2E391219012	10	Valve Plug Spring 302 Stainless steel	1E392437022
3*	Orifice 416 Stainless steel	1E393235132	11	Spring Zinc-plated steel, Yellow	1E392527022
4*	Valve Plug 416 Stainless steel Nitrile (NBR)	1E3933000E2	12*	Diaphragm Neoprene (CR)	1E393502112
5	Valve Plug Guide 416 Stainless steel	1E391835132	13	Nameplate -----	-----
6	Stem Assembly 416 Stainless steel	1F2113000A2	15	Adjusting Screw, Plated Carbon steel	1E639928992
7*	Stem Guide Bushing 416 Stainless steel	1E392235132	16	Cap Screw (6 required) Zinc-plated steel	1A407824052
			17	Locknut, Zinc-plated steel	1A352224122

\*Recommended spare part.

# Types 1098-EGR and 1098H-EGR

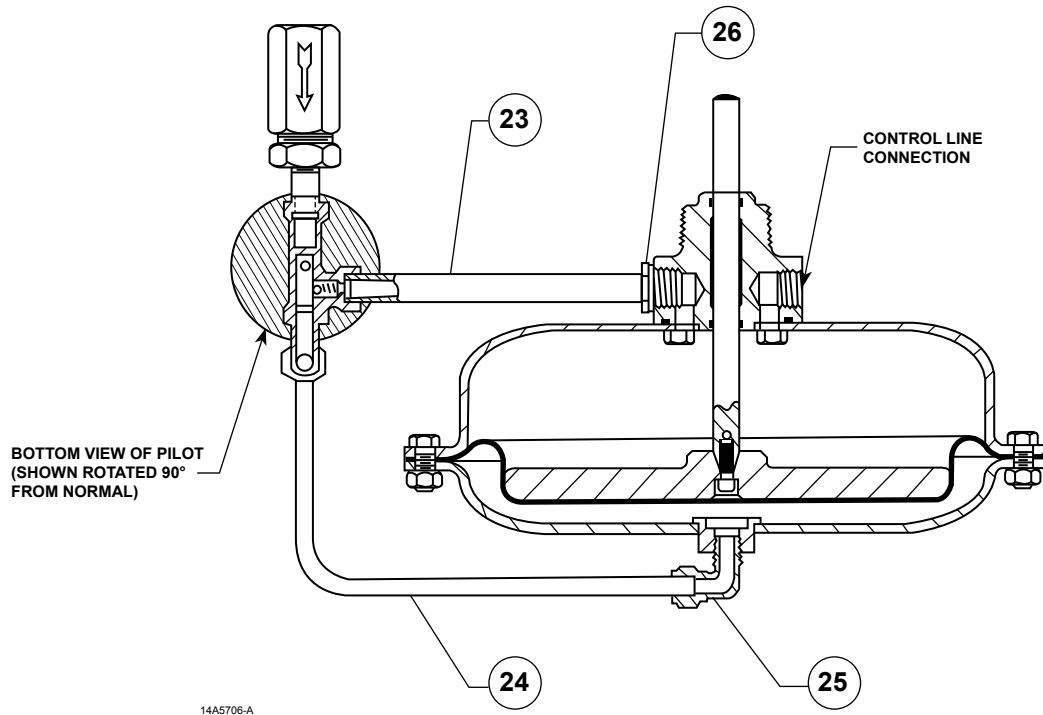


Figure 24. Single-Pilot Mounting Assembly

## Mounting Parts

### 6350 Series Mounting Parts (Figure 24)

Key	Description	Part Number	Key	Description	Part Number
16	Pipe Tee for use with 50 psig / 3.4 bar relief	-----	25	Tube Fitting Elbow (2 required for standard and 3 required for use with 50 psig / 3.4 bar relief mounting)	-----
21	Tube Fitting Connector for use with 50 psig / 3.4 bar relief, steel	-----		Actuator Sizes 30 and 40	-----
23	Pipe Nipple	-----		Brass	-----
	Type 1098	-----		Aluminum (NACE)	-----
	Actuator Sizes 30 and 40	-----		Steel	-----
	Plated steel	-----		Stainless steel (NACE)	-----
	Stainless steel (NACE)	-----		Actuator Size 70	-----
	For use with 50 psig / 3.4 bar relief	-----		Brass	-----
	Actuator Size 70	-----		Steel	-----
	Plated steel	-----		Stainless steel (NACE)	-----
	Stainless steel (NACE)	-----	26	Pipe Bushing	-----
	Type 1098H	-----		Steel (NACE)	-----
	Steel	-----		Stainless steel (NACE)	-----
	Stainless steel	-----	51	Pipe Nipple, for use with 50 psig / 3.4 bar relief (2 required) (not shown)	-----
24	Tubing	-----	52	Pipe Tee, for use with 50 psig / 3.4 bar relief (not shown)	-----
	Actuator Sizes 30 and 40	-----			
	Copper	-----			
	Stainless steel (NACE)	-----			
	Actuator Size 70	-----			
	Copper	-----			
	Stainless steel (NACE)	-----			

# Types 1098-EGR and 1098H-EGR

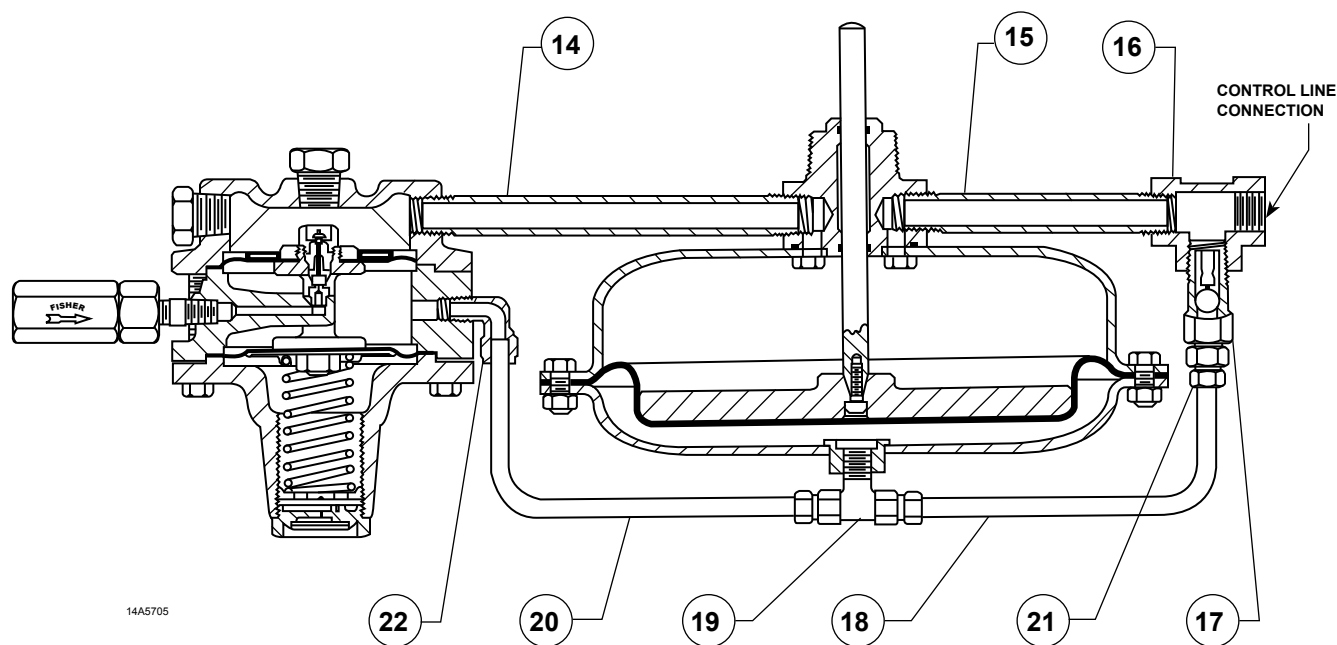


Figure 25. 61 Series Pilot and Type 1806 Relief Valve Mounting

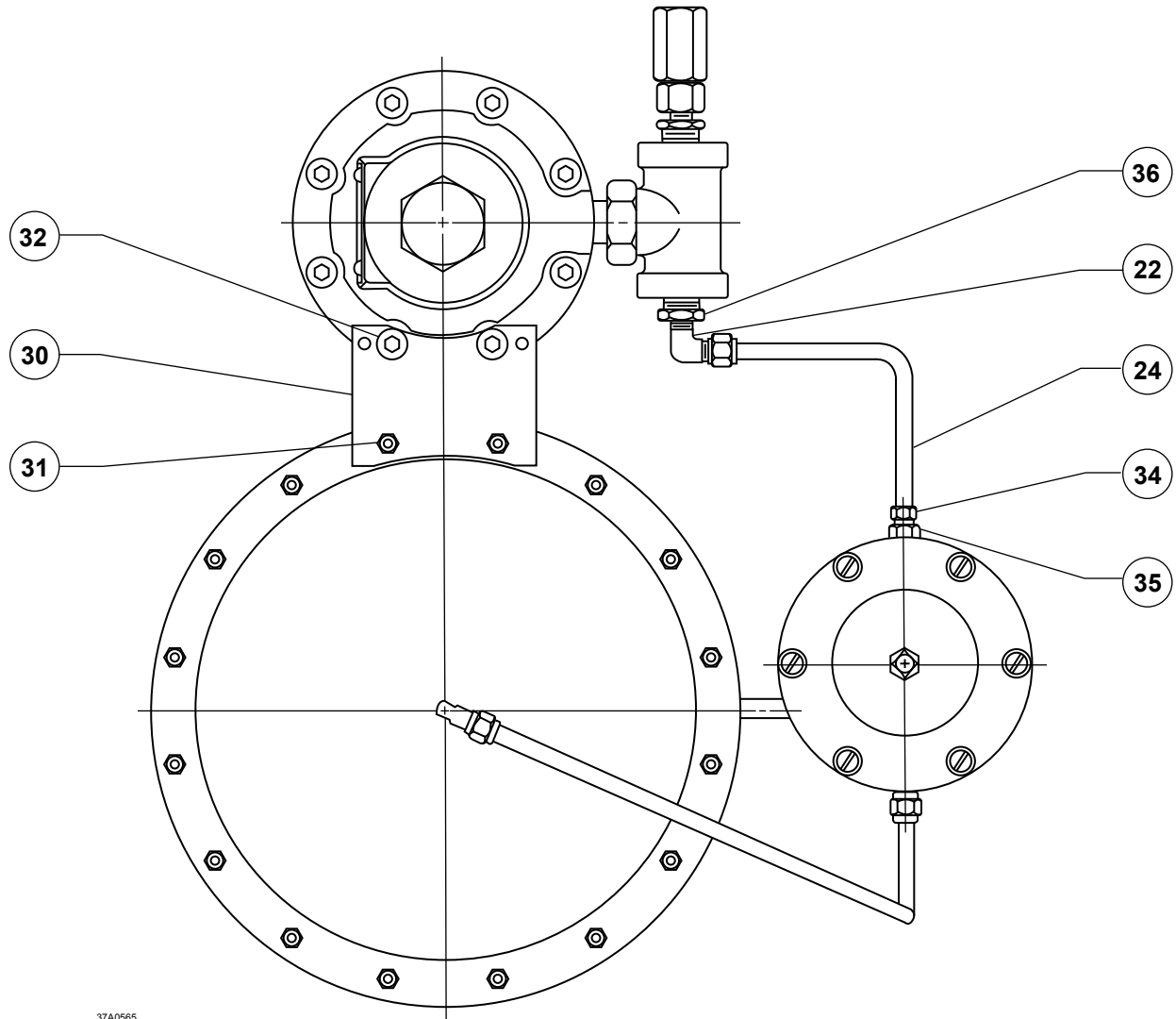
## Mounting Parts (continued)

### 61 Series Mounting Parts (Figure 25)

Key	Description	Part Number	Key	Description	Part Number
14	Pipe Nipple		20	Loading Tubing	
	For standard 61 Series mounting			For standard 61 Series mounting	
	Actuator Sizes 30 and 40	-----		Actuator Sizes 30 and 40	
	Actuator Size 70	-----		Copper	-----
	Negative shock service			Stainless steel	-----
	Actuator Sizes 30 and 40	-----		Negative shock service	-----
	Actuator Size 70	-----	21	Tube Fitting Connector	
15	Pipe Nipple			Brass	-----
	Actuator Sizes 30 and 40	-----		Steel	-----
	Actuator Size 70	-----		Stainless steel	-----
16	Pipe Tee	-----	22	Tube Fitting Elbow	
18	Relief Tubing			Brass	-----
	Actuator Sizes 30 and 40			Steel	-----
	Copper	-----		Stainless steel	-----
	Stainless steel	-----	26	Pipe Bushing for size 70 actuator only	-----
	Actuator Size 70		39	Pipe Nipple for negative shock service only	-----
	Copper	-----	53	Pipe Elbow for negative shock service only	-----
	Stainless steel	-----			
19	Tube Fitting Tee				
	Brass	-----			
	Steel	-----			
	Stainless steel	-----			



# Types 1098-EGR and 1098H-EGR



**Figure 26. Working Monitor Assembly**

## Auxiliary Pilot Mounting Parts (Figure 26)

Key	Description	Part Number	Key	Description	Part Number
22	Tube Elbow	-----	34	Flared Nut (1 required for use with Type 6352 pilot and 2 required with Type 61H Pilot)	-----
24	Tubing	-----	35	Tube Connector (1 required for use with Type 6352 pilot and 2 required with Type 61H Pilot)	-----
30	Mounting Bracket	-----	36	Pipe Bushing, Hex (2 required)	-----
31	Cap Screw (2 required)	-----			
32	Cap Screw (2 required)	-----			
	For Type 627-109	-----			
	For Type 161AYW	-----			

# Types 1098-EGR and 1098H-EGR

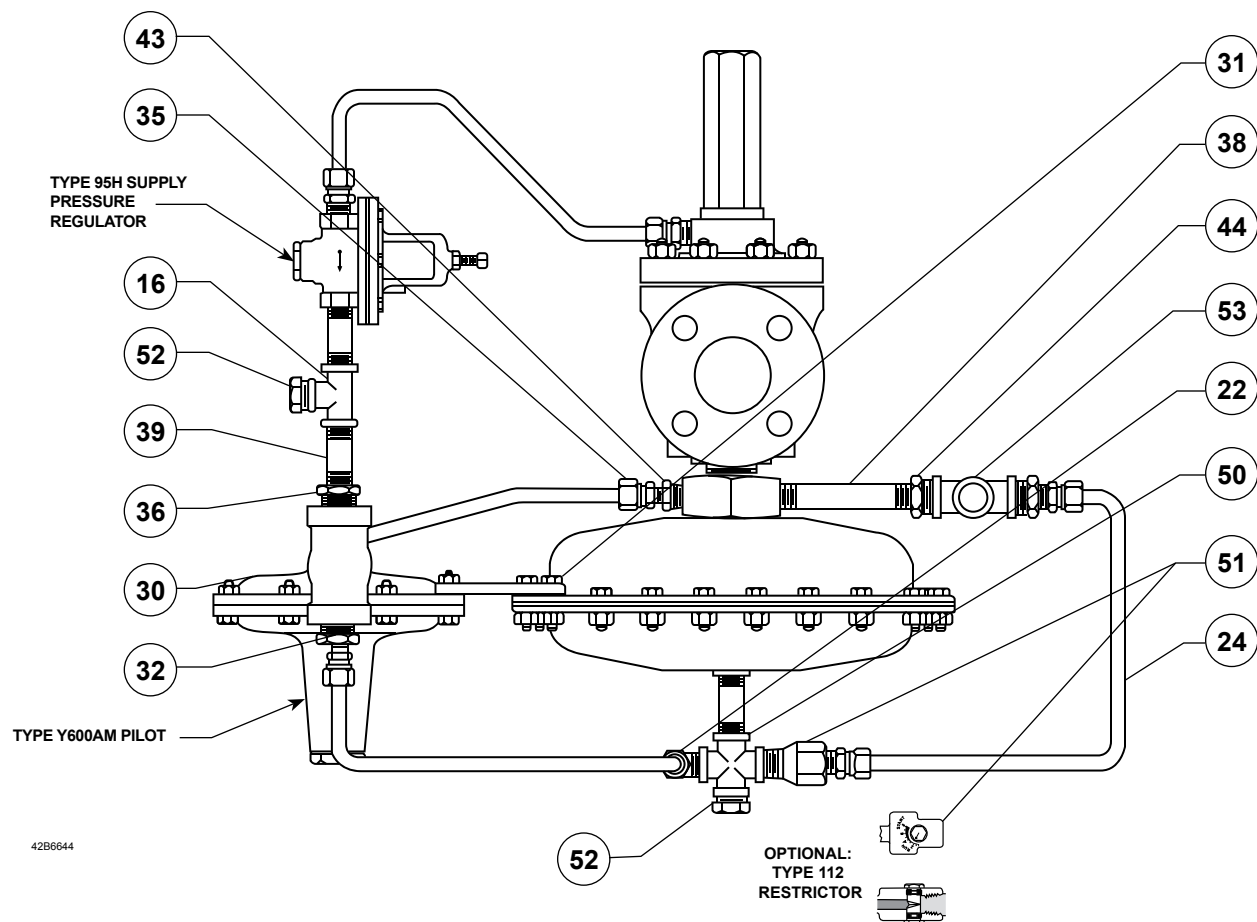


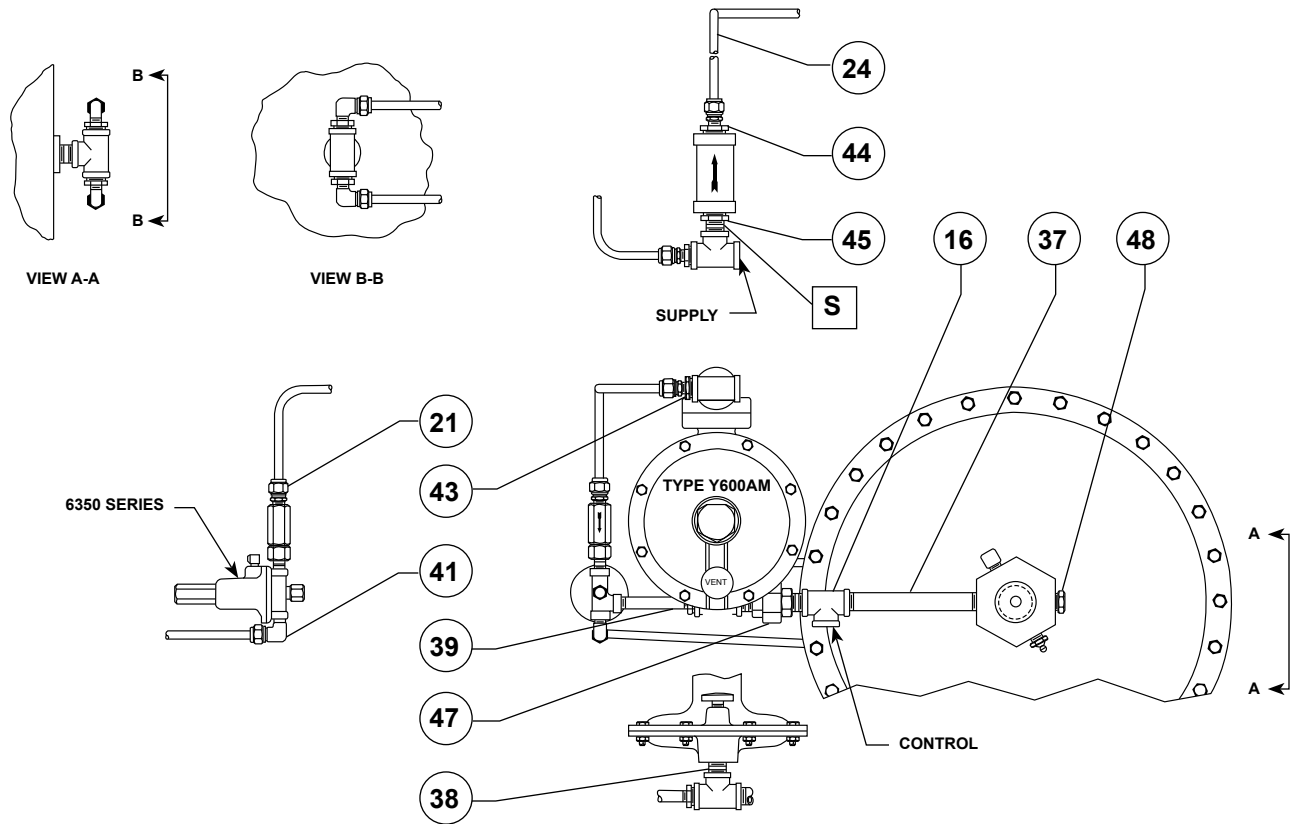
Figure 27. Type 1098-EGR with Type Y600AM Mounting Parts

## Mounting Parts (continued)

### Type 1098-EGR with Type Y600AM Mounting Parts (Figure 27)

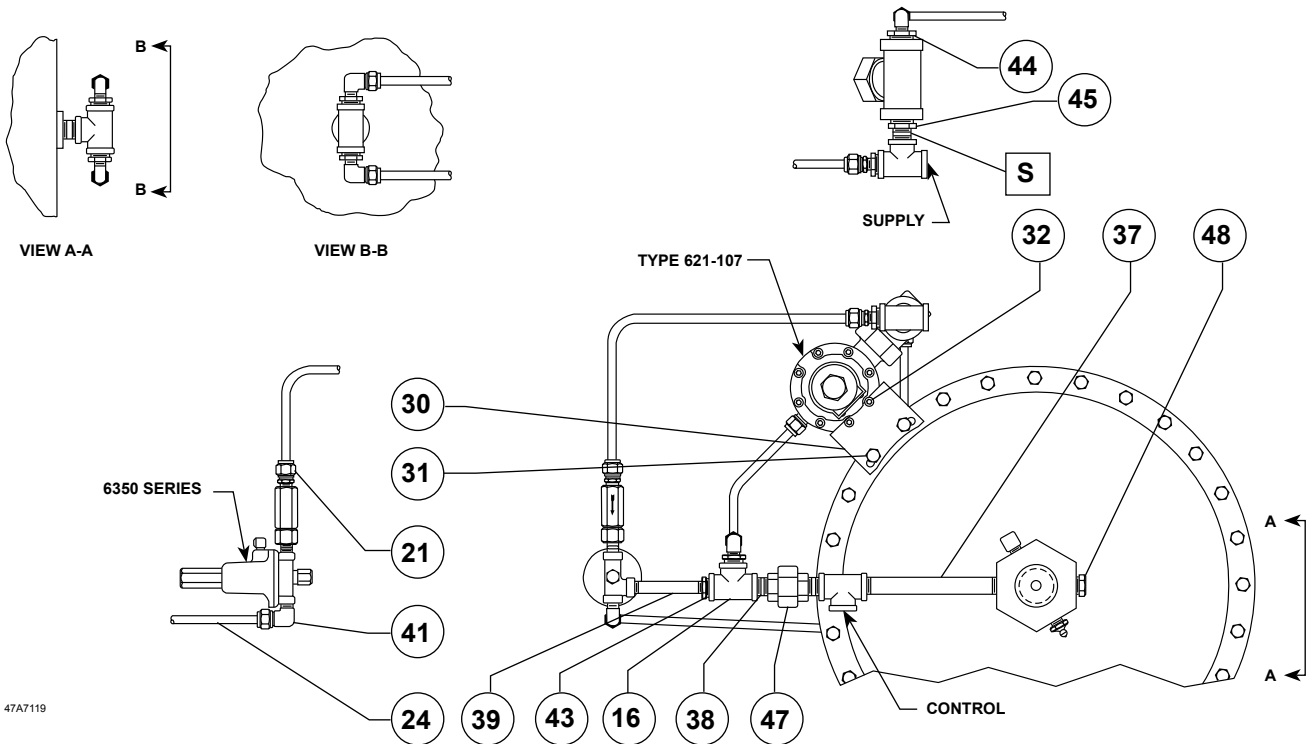
Key	Description	Part Number	Key	Description	Part Number
16	Pipe Tee Stainless steel	-----	39	Pipe Nipple (3 required) 316 Stainless steel	-----
22	Tubing Elbow Stainless steel	-----	43	Pipe Bushing (5 required) 316 Stainless steel	-----
24	Tubing Stainless steel	-----	44	Pipe Bushing 316 Stainless steel	-----
30	Mounting Bracket, steel	-----	50	Pipe Cross 316 Stainless steel	-----
31	Cap Screw, Zinc-plated steel (2 required)	-----	51	Restrictor Fixed Restriction, 316 Stainless steel	-----
32	Cap Screw, Zinc-plated steel (2 required)	-----		Variable Restriction (Optional)	-----
35	Tubing Connector (4 required) Stainless steel	-----	52	Pipe Plug (2 required) Steel	-----
36	Pipe Bushing (3 required) Stainless steel	-----		316 Stainless steel	-----
38	Pipe Nipple 316 Stainless steel	-----	53	Pipe Tee 316 Stainless steel	-----

# Types 1098-EGR and 1098H-EGR



47A7118

TYPE Y600AM AND SIZE 70 TYPE 1098 COMBINATION



47A7119

TYPE 627M AND SIZE 70 TYPE 1098 COMBINATION

□ APPLY SEALANT (S) ALL NPT THREAD

Figure 28. Boiler Fuel Pressure Control Assembly

# Types 1098-EGR and 1098H-EGR

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